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1983

No. WC-4-15857-116

SPECIFICATIONS

FORT PECK-HAVRE 230-KV TRANSMISSION LINE

STATE DOCUMENTS COLLECTION
MONTANA STATE LIBRARY
1515 E. 6TH AVE.
HELENA, MONTANA 59620

MONTANA

DE-FB65-84WP15857

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These Specifications Issued
by the
Department of Energy
Western Area Power Administration
P. O. Box 3402
Golden, Colorado 80401

FOREWORD

The work under these specifications consists of removing an existing 161-kilovolt, wood-pole H-frame transmission line in its entirety, approximately 188 miles in length; and furnishing all materials and constructing a new single-circuit, 3-phase, wood-pole H-frame, 230-kilovolt transmission line approximately 180 miles in length in Hill, Blaine, Phillips, Valley, and McCone Counties, Montana. The conductor shall be nonspecular type, 954,000-circular mil, 45/7 stranding, ACSR. The line shall have two 3/8-inch diameter, 7-strand, high-strength steel overhead ground wires the entire length of the line.

PHONE INQUIRIES

regarding these specifications should

be made to the following:

Electrical Design Division	303-231-1591
Construction and Inspection Division	303-231-1669
Contracting Officer (Inquiries regarding award)	303-231-1580
Assistant Area Manager for Construction, Huron, South Dakota	605-352-8651

Contractors requiring technical clarification shall submit their questions in writing.

(Price $25.00)

STANDARD FORM 30, JULY 1966
GENERAL SERVICES ADMINISTRATION
FED PROC. REG. (41 CFR) 1-16.101

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

PAGE 1 OF

1. AMENDMENT/MODIFICATION NO.	2. EFFECTIVE DATE	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO. *(If applicable)*
M001	11/15/83		

5. ISSUED BY CODE
U.S. Department of Energy
Western Area Power Administration
P.O. Box 3402, A1521, Linda K. Bell
Golden, Colorado 80401

6. ADMINISTERED BY *(If other than block 5)* CODE

7. CONTRACTOR NAME AND ADDRESS CODE FACILITY CODE

(Street, city, county, state, and ZIP Code)

ALL BIDDERS

8.
[X] AMENDMENT OF SOLICITATION NO. DE-FB65-84WP15857,
DATED 11/15/83 *(See block 9)*
[ ] MODIFICATION OF CONTRACT/ORDER NO. _____
DATED _____ *(See block 11)*

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

[·] The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers [ ] is extended, [ ] is not extended.

Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning _____ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA *(If required)*

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a) [ ] This Change Order is issued pursuant to _____
The Changes set forth in block 12 are made to the above numbered contract/order.

(b) [ ] The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c) [ ] This Supplemental Agreement is entered into pursuant to authority of _____
It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

FORT PECK-HAVRE TRANSMISSION LINE

MONTANA

Solicitation DE-FB65-84WP15857 is amended as follows:

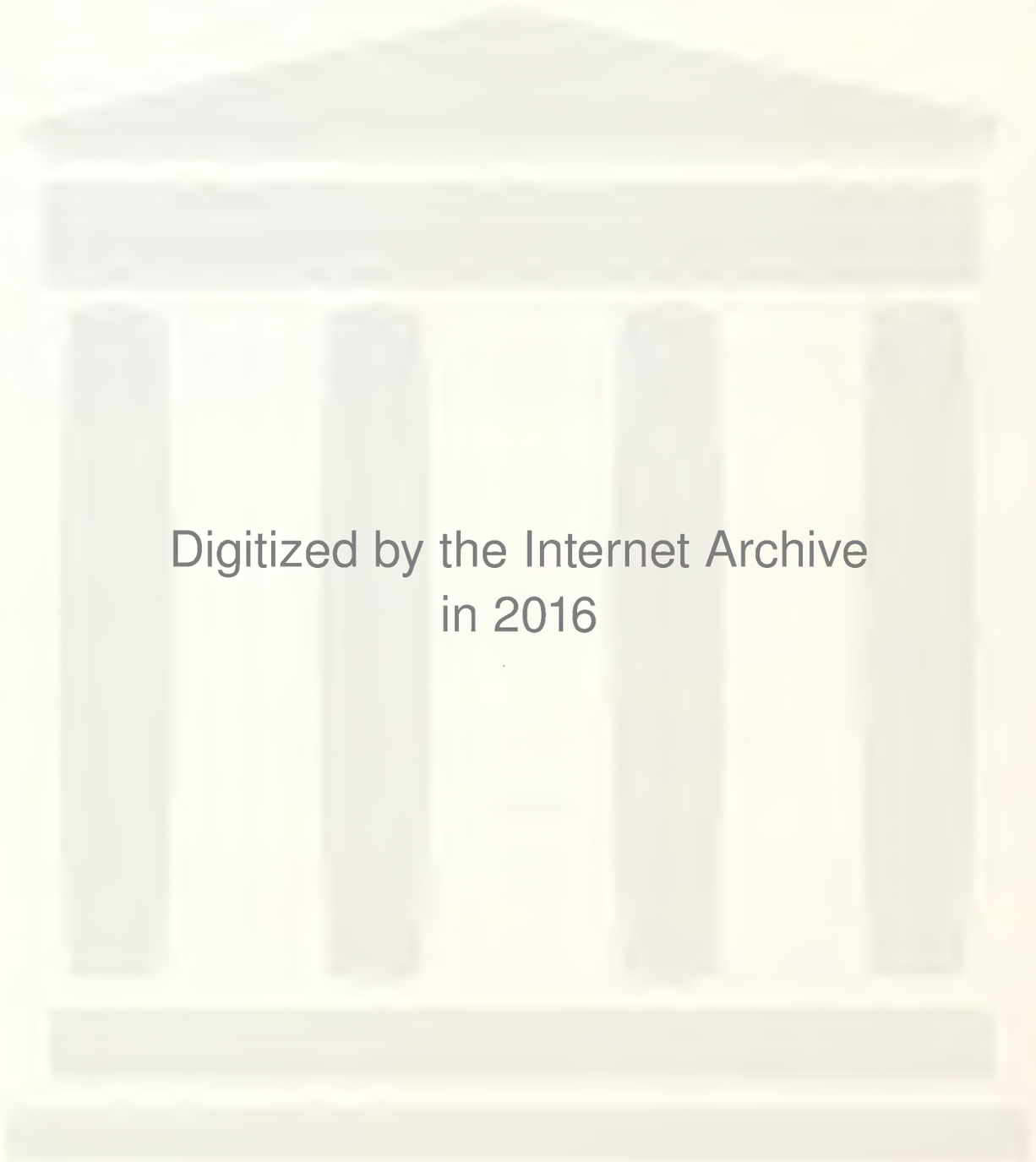
Remove pages 36 of 142 through 43 of 142 and insert the attached revised pages 36 of 142 through 43 of 142.

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13. [ ] CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT [ ] CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN _____ COPIES TO ISSUING OFFICE

14. NAME OF CONTRACTOR/OFFEROR		17. UNITED STATES OF AMERICA	
BY _____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)	
15. NAME AND TITLE OF SIGNER *(Type or print)*	16. DATE SIGNED	18. NAME OF CONTRACTING OFFICER *(Type or print)*	19. DATE SIGNED

☆ U.S. GOVERNMENT PRINTING OFFICE : 1981 O - 341-526 (6639)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SECTION E

SUPPLIES/SERVICES AND PRICES BID FORM

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

FORT PECK-HAVRE
230-KV TRANSMISSION LINE

SCHEDULE - PART A

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
I.	BASE BID			
1.	Mobilization and preparatory work	For a lump sum not to exceed 5 percent of total of this Schedule		$_____
2.	Removing existing transmission line	For the lump sum of		$_____
3.	Clearing right-of-way	For the lump sum of		$_____
4.	Corrugated metal pipe culverts, 24-inch diameter	25 feet	$_____	$_____
5.	Corrugated metal pipe culverts, 30-inch diameter	175 feet	$_____	$_____
6.	Barbed-wire gates on right-of-way	300 gates	$_____	$_____
7.	Barbed-wire gates off right-of-way	55 gates	$_____	$_____
8.	Prefabricated steel gates	30 gates	$_____	$_____
	Structures with Class 2 poles and maximum pole lengths as follows:			
	Type HSB structures			
9.	55-foot pole	10 structures	$_____	$_____
10.	60-foot pole	51 structures	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
11.	65-foot pole	108 structures	$_____	$_____
12.	70-foot pole	193 structures	$_____	$_____
13.	75-foot pole	258 structures	$_____	$_____
14.	80-foot pole	444 structures	$_____	$_____
15.	85-foot pole	40 structures	$_____	$_____
	Type HSB-1 structures			
16.	85-foot pole	111 structures	$_____	$_____
17.	90-foot pole	38 structures	$_____	$_____
18.	95-foot pole	18 structures	$_____	$_____
19.	100-foot pole	5 structures	$_____	$_____
20.	105-foot pole	2 structures	$_____	$_____
	Type HSB-2 structures			
21.	95-foot pole	1 structure	$_____	$_____
	Type HSB-3 structures			
22.	65-foot pole	1 structure	$_____	$_____
23.	70-foot pole	3 structures	$_____	$_____
24.	75-foot pole	7 structures	$_____	$_____
25.	80-foot pole	6 structures	$_____	$_____
	Type 3A-1 structures			
26.	65-foot pole	1 structure	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
27.	70-foot pole	1 structure	$_____	$_____
28.	75-foot pole	1 structure	$_____	$_____
29.	80-foot pole	2 structures	$_____	$_____
30.	85-foot pole	2 structures	$_____	$_____
31.	90-foot pole	2 structures	$_____	$_____
	Type 3A-2 structures			
32.	60-foot pole	1 structure	$_____	$_____
	Type 3A-3 structures			
33.	60-foot pole	1 structure	$_____	$_____
34.	70-foot pole	4 structures	$_____	$_____
35.	75-foot pole	8 structures	$_____	$_____
36.	80-foot pole	8 structures	$_____	$_____
37.	90-foot pole	1 structure	$_____	$_____
38.	100-foot pole	1 structure	$_____	$_____
	Type 3A-4 structures			
39.	60-foot pole	1 structure	$_____	$_____
40.	70-foot pole	4 structures	$_____	$_____
41.	75-foot pole	2 structures	$_____	$_____
42.	85-foot pole	1 structure	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
43.	90-foot pole	1 structure	$_____	$_____
44.	95-foot pole	2 structures	$_____	$_____
	Type 3AB-2 structures			
45.	85-foot pole	1 structure	$_____	$_____
	Type 3AB-3 structures			
46.	85-foot pole	2 structures	$_____	$_____
	Type 3AC-1 structures			
47.	70-foot pole	1 structure	$_____	$_____
	Type 3AC-2 structures			
48.	65-foot pole	2 structures	$_____	$_____
49.	70-foot pole	4 structures	$_____	$_____
50.	75-foot pole	3 structures	$_____	$_____
51.	80-foot pole	4 structures	$_____	$_____
52.	85-foot pole	1 structure	$_____	$_____
	Type 3AC-3 structures			
53.	70-foot pole	2 structures	$_____	$_____
54.	75-foot pole	1 structures	$_____	$_____
55.	80-foot pole	4 structures	$_____	$_____
56.	85-foot pole	1 structure	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
57.	90-foot pole	1 structure	$_____	$_____
	Type 3AC-4 structures			
58.	80-foot pole	1 structure	$_____	$_____
	Type 3TA-1 structures			
59.	60-foot pole	1 structure	$_____	$_____
60.	65-foot pole	2 structures	$_____	$_____
61.	70-foot pole	3 structures	$_____	$_____
62.	75-foot pole	1 structure	$_____	$_____
63.	80-foot pole	3 structures	$_____	$_____
64.	85-foot pole	4 structures	$_____	$_____
65.	90-foot pole	1 structure	$_____	$_____
66.	95-foot pole	1 structure	$_____	$_____
	Type 3TA-2 structures			
67.	80-foot pole	2 structures	$_____	$_____
68.	85-foot pole	1 structure	$_____	$_____
69.	90-foot pole	2 structures	$_____	$_____
	Type 3TA-4 structures			
70.	75-foot pole	1 structure	$_____	$_____
71.	80-foot pole	1 structure	$_____	$_____
	Type 3TA-5 structures			
72.	75-foot pole	1 structure	$_____	$_____
73.	80-foot pole	2 structures	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
74.	90-foot pole	1 structure	$_____	$_____
	Type 3TA-6 structures			
75.	75-foot pole	1 structure	$_____	$_____
	Type 3TA-7 structures			
76.	60-foot pole	1 structure	$	$
77.	70-foot pole	2 structures	$_____	$_____
78.	80-foot pole	4 structures	$_____	$_____
79.	85-foot pole	2 structures	$_____	$_____
80.	90-foot pole	2 structures	$_____	$_____
	Type 3TA-8 structures			
81.	80-foot pole	2 structures	$_____	$_____
82.	Guy protectors	96 protectors	$_____	$_____
83.	Bog shoes	18 shoes	$_____	$_____
84.	Bog anchors	6 anchors	$_____	$_____
85.	Special pole foundations	6 foundations	$_____	$_____
	Insulator assemblies for 954,000-circular mil, ACSR, 45/7 conductor as follows:			
86.	Single-string suspension-type with 12 insulator units per assembly	3888 assemblies	$_____	$_____
87.	Single-string suspension-type with 13 insulator units per assembly	75 assemblies	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
88.	Single-string suspension-type with yoke plate, two suspension clamps and 13 insulator units per assembly	135 assemblies	$_____	$_____
89.	Single-string tension-type with 13 insulator units per assembly	246 assemblies	$_____	$_____
90.	Line post insulator assembly with clamp suitable for 954,000-circular mil, ACSR, 45/7 conductor	84 assemblies	$_____	$_____
91.	Additional work and materials required for stringing adjacent to existing energized transmission lines	95 miles	$_____	$_____
92.	Stringing three 954,000-circular mil, ACSR, 45/7 nonspecular conductors	179.3 miles	$_____	$_____
93.	Stringing two 3/8-inch diameter high-strength steel, 7-strand overhead ground wires	179.3 miles	$_____	$_____
94.	Stockbridge-type vibration dampers attached directly to 954,000-circular mil, ACSR conductors	4230 dampers	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
95.	Fence grounds for non-electric fences	1500 fence grounds	$_____	$_____
96.	Hold down weights, 100 pound	9 weights	$_____	$_____
97.	Approach spans leading into and out of the various substations	For the lump sum of		$_____
		TOTAL FOR THE BASE BID		$_____
*II.	ALTERNATE NO. 1			
	Stockbridge-type vibration dampers attached directly to 3/8-inch high strength, 7-strand overhead ground wires	5640 dampers	$_____	$_____
*III.	ALTERNATE NO. 2			
	Preformed-type vibration dampers attached directly to 3/8-inch high strength, 7-strand overhead ground wires	11,280 dampers	$_____	$_____

*The bidder shall bid on either Alternate No. 1 or Alternate No. 2 at its option. A bid on both alternates is not required or desired. However, should the bidder bid on both alternates, the Government reserves the right to make award based on the lowest combination of Base Bid plus either alternative.

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STANDARD FORM 20
JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

INVITATION FOR BIDS
(CONSTRUCTION CONTRACT)

REFERENCE
Invitation for Bid
DE-FB65-84WP15857

DATE
November 15, 1983

NAME AND LOCATION OF PROJECT

Fort Peck-Havre 230-kV Transmission Line
Hill, Blaine, Phillips, Valley and McCone Counties, Montana

DEPARTMENT OR AGENCY

U.S. Department of Energy
Western Area Power Administration
P.O. Box 3402
Golden, Colorado 80401

BY (*Issuing office*)
U.S. Department of Energy, Western Area Power Administration,
P.O. Box 3402, A1521, Linda K. Bell, Golden, Colorado 80401

Sealed bids in one (1) copy for the work described herein will be received until 10:00 a.m. (local time at place of bid opening), December 20, 1983

at Department of Energy, Western Area Power Administration, Room 300, Federal Building, 200 Fourth Street, S.W., Huron, South Dakota (mailed bids should be addressed to P.O. Box 921, Huron, South Dakota 57350).

and at that time publicly opened.

Information regarding bidding material, bid guarantee, and bonds

BID BOND: If the bid exceeds $25,000, the bidder shall furnish guarantee with each bid in the amount of not less than 20 percent of the amount of bid.

PERFORMANCE AND PAYMENT BONDS: If the contract price exceeds $25,000, the successful bidder shall furnish performance bond with a penal amount equal to 100 percent of the contract price at the time and payment bond in the amount stated in the specifications.

STANDARD FORMS: Bids must be submitted upon the standard Government Bid Form for Construction (Standard Form 21). The successful bidder will be required to execute the standard Government form of contract for construction (Standard Form 23).

AFFIRMATIVE ACTION: The contract to be awarded under this Invitation for Bids will be subject to the affirmative action requirements of the specifications for equal employment.

Description of work

The principle components of work include complete removal of approximately 188 miles of existing Fort Peck-Havre 161-kV transmission line; furnishing and installing wood pole structures, conductor insulator assemblies; overhead ground wire assemblies; furnishing and stringing three 954,000 - circular-mil, ACSR, 45/7 nonspecular conductors; furnishing and stringing two 3/8-inch diameter, high strength steel, 7-wire overhead ground wire; and furnishing and installing gates in right-of-way fences, conductor weights, vibration dampers, structure signs, and all materials to complete the various approach spans.

U.S. GOVERNMENT PRINTING OFFICE : 1974—O-535-329

WAGE DETERMINATION: The wage rates set forth are the minimum rates which may be paid to the classifications of laborers and mechanics designated therein pursuant to the Davis-Bacon Act (Act of March 3, 1931, as amended; 40 U.S.C. 276a et seq.). DOE does not represent that said minimum rates do now, nor that they will at any time in the future, prevail in the locality of the work for such laborers or mechanics; not that such mechanics or laborers are or will be obtainable at said rates for work under this contract; nor that said rates represent the most recent wage determination by the Secretary of Labor with respect to such classification of laborers or mechanics in the locality of the work.

The estimated cost of construction is over $10,000,000.

REPRESENTATIONS AND CERTIFICATIONS

(Construction and Architect-Engineer Contract)

(For use with Standard Forms 19, 21 and 252)

REFERENCE *(Enter same No.(s) as on SF 19, 21 and 252)*

NAME AND ADDRESS OF BIDDER (*No., Street, City, State, and ZIP Code*)

DATE OF BID

In negotiated procurements, "bid" and "bidder" shall be construed to mean "offer" and "offeror."

The bidder makes the following representations and certifications as a part of the bid identified above. *(Check appropriate boxes.)*

1. SMALL BUSINESS

He ☐ is, ☐ is not, a small business concern. (A small business concern for the purpose of Government procurement is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operations in which it is bidding on Government contracts, and can further qualify under the criteria concerning number of employees, average annual receipts, or other criteria as prescribed by the Small Business Administration. For additional information see governing regulations of the Small Business Administration (13 CFR Part 121)).

2. MINORITY BUSINESS ENTERPRISE

He ☐ is, ☐ is not a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts."

3. CONTINGENT FEE

(a) He ☐ has, ☐ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and *(b)* he ☐ has, ☐ has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to *(a)* and *(b)* above as requested by the Contracting Officer. *(For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.)*

4. TYPE OF ORGANIZATION

He operates as an ☐ individual, ☐ partnership, ☐ joint venture, ☐ corporation, incorporated in State of . . . . . .

5. INDEPENDENT PRICE DETERMINATION

(a) By submission of this bid, each bidder certifies, and in the case of a joint bid each party thereto certifies as to his own organization, that in connection with this procurement:

(1) The prices in this bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, in the case of a bid, or prior to award, in the case of a proposal, directly or indirectly to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

(b) Each person signing this bid certifies that:

(1) He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein and that he has not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*)(3) above; or

(2) (i) He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein but that he has been authorized in writing to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*) (3) above, and as their agent does hereby so certify; and (ii) he has not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*)(3) above.

(c) This certification is not applicable to a foreign bidder submitting a bid for a contract which requires performance or delivery outside the United States, its possessions, and Puerto Rico.

(d) A bid will not be considered for award where (*a*)(1), (*a*)(3), or (*b*) above, has been deleted or modified. Where (*a*)(2) above, has been deleted or modified, the bid will not be considered for award unless the bidder furnishes with the bid a signed statement which sets forth in detail the circumstances of the disclosure and the head of the agency, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

NOTE.—Bids must set forth full, accurate, and complete information as required by this invitation for bids (including attachments). The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

STANDARD FORM 19-B, JUNE 1976 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401 AND 1-16.701

THE FOLLOWING NEED BE CHECKED ONLY IF BID EXCEEDS $10,000 IN AMOUNT.

6. EQUAL OPPORTUNITY

He ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity Clause herein, the clause originally contained in Section 301 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114; he ☐ has, ☐ has not, filed all required compliance reports; and representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards.

(The above representations need not be submitted in connection with contracts or subcontracts which are exempt from the equal opportunity clause.)

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each bidder shall furnish the following information by filling in the appropriate blocks:

(a) Is the bidder owned or controlled by a parent company as described below? ☐ Yes ☐ No. *(For the purpose of this bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the bidder. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine, or veto basic business policy decisions of the bidder, such other company is considered the parent company of the bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)*

(b) If the answer to *(a)* above is "Yes," bidder shall insert in the space below the name and main office address of the parent company.

NAME OF PARENT COMPANY	MAIN OFFICE ADDRESS *(No., Street, City, State, and ZIP Code)*

(c) Bidder shall insert in the applicable space below, if he has no parent company, his own Employer's Identification Number (E.I. No.) *(Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941)*, or, if he has a parent company, the E.I. No. of his parent company.

EMPLOYER IDENTIFICATION NUMBER OF	PARENT COMPANY	BIDDER
➔		

8. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to (1) contracts, (2) subcontracts, and (3) agreements with applicants who are themselves performing federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause.)

By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certificatons from proposed subcontractors prior to the award of subcontractors exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

9. CLEAN AIR AND WATER

(Applicable if the bid or offer exceeds $100,000, or the contracting officer has determined that orders under an indefinite quantity contract in any year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c–8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The bidder or offeror certifies as follows:

(a) Any facility to be utilized in the performance of this proposed contract has ☐, has not ☐, been listed on the Environmental Protection Agency List of Violating Facilities.

(b) He will promptly notify the contracting officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility which he proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.

(c) He will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1981 O - 341-526 (7099)

SUPPLEMENT TO STANDARD FORM 19-B

a. The following is added as item 10 of Standard Form 19-B:

10. REPRESENTATION, AFFIRMATIVE ACTION PROGRAM

The bidder represents that it (check appropriate box):

(a) [ ] has developed and has on file

[ ] has not developed and does not have on file

at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or

(b) [ ] has not previously had contracts subject to the written affirmative action program requirement of the rules and regulations of the Secretary of Labor.

b. Items 11, 12, 13, 14, and 15 are hereby added to Standard Form 19-B:

11. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION

(a) The offeror [ ] Contractor [ ] certifies that it is [ ], is not [ ], a small business concern as defined in accordance with section 3 of the Small Business Act (15 U.S.C. 632).

(b) The offeror [ ] Contractor [ ] certifies that it is a small business (as set forth in (a) above) and is [ ], is not [ ], owned and controlled by socially and economically disadvantaged individuals. Such a firm is defined as one:

(i) which is at least 51 percent owned by one or more such individuals or, in the case of publicly owned business, at least 51 per centum of the stock is owned by such individuals,

(ii) whose management and daily business operations are controlled by one or more such individuals, and

(iii) which certifies concerning said ownership and control in accordance with section (c) below.

(c) The offeror [ ] Contractor [ ] certifies that it is [ ], is not [ ], a minority individual(s) in accordance with (c)(i) below or that he is [ ], is not [ ], socially and economically disadvantaged in accord with section (c)(ii) or (c) (iii). Socially and economically disadvantaged individuals are defined as:

(i) United States citizens who are Black Americans, Hispanic Americans, Native Americans, or other specified minorities;

(ii) any other individual found to be disadvantaged pursuant to section 8(a) of the Small Business Act (15 U.S.C. 637); or

(iii) any other individual defined as socially and economically disadvantaged, for purposes relating to other sections of the Small Business Act.

No solicitation may be properly considered without this certification and no award may be made without its being executed.

12. WOMAN-OWNED BUSINESS

Concern is [ ], is not [ ], a woman-owned business. A woman-owned business is a business which is at least 51 percent owned, controlled, and operated by a woman or women. Controlled is defined as exercising the power to make policy decisions. Operated is defined as actively involved in the day-to-day management. For the purposes of this definition, businesses which are publicly owned, joint stock associations, and business trusts are exempted. Exempted businesses may voluntarily represent that they are or are not woman-owned if this information is available.

13. SUBCONTRACTING CERTIFICATION

(a) The offeror represents that the following conditions prevail which determine whether the firm shall be required to submit a subcontracting plan for small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals:

(1) He is [ ] a small business as defined in accordance with 13 CFR, Part 121 of the SBA regulations;

(2) Subcontracting possibilities are not offered with respect to this contract [ ]; and

(3) The contract is not expected to exceed $1,000,000 (if solely for construction of a public facility) or $500,000 otherwise [ ].

(b) The offeror represents that he is not [ ] required to submit plans for subcontracting with small and small disadvantaged businesses because he has properly executed one or more of the above representations.

14. CERTIFICATION OF ELIGIBILITY

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act of 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act of 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

INFORMATION REGARDING BUY AMERICAN ACT

(a) The Buy American Act (41 U.S.C. 10a-10d) generally requires that only domestic construction material be used in the performance of this contract. (See the clause entitled "Buy American" General Provisions, Construction Contract.) This requirement does not apply to the following construction material or components:

Antimony	Logs, veneer, and lumber from balsa, greenheart, lignum vitae, mahogany, and teak
Asbestos	
Bauxite	
Chrome ore or chromite	Mica
Cobalt	Nickel
Cork	Rubber and crude latex
Graphite	
Jute and jute burlap	

(b) (1) Furthermore, bids or proposals offering use of additional nondomestic construction material may be acceptable for award if the Government determines that use of comparable domestic construction material is impracticable, or would unreasonably increase the cost, or that domestic construction material (in sufficient and reasonably available commercial quantities and of a satisfactory quality) is unavailable. Reliable evidence shall be furnished justifying such use of additional nondomestic construction material.

(2) Where it is alleged that use of domestic construction material would unreasonably increase the cost:

(i) Data shall be included by the bidder, based on a reasonable canvass of suppliers, demonstrating that the cost of each such domestic construction material would exceed by more than 6 percent the cost of comparable nondomestic construction material. (All costs of delivery to the construction site shall be included, as well as any applicable duty.)

(ii) For evaluation purposes, 6 percent of the cost of all additional nondomestic construction material, which qualifies under paragraph (i) above, will be added to the bid or proposal.

(3) When offering additional nondomestic construction material, bids or proposals may also offer, at stated prices, any available comparable domestic construction material, so as to avoid the possibility that failure of a nondomestic construction material to be acceptable under (1) above will cause rejection of the entire bid.

NOTE: Unless bidder intends to furnish NONDOMESTIC construction materials, it is unnecessary to complete this form, but it should be returned with the bid.

15. REPRESENTATIONS BY BIDDER PURSUANT TO "BUY AMERICAN ACT"

Bidder represents that all construction materials to be used, other than those specifically exempt from the requirements of the Buy American Act as listed on the back of this form, will be domestic materials conforming to the clause entitled "Buy American," of the General Provisions (Standard Form 23-A) except as noted below:

Name of each item of nondomestic material	Quantity (weight, feet,no., etc.)	Cost delivered to the job site
	Total	$

The Contractor will be limited in the use of nondomestic materials to those listed above and those specifically exempt from the requirements of the Buy American Act as listed on the back of this form.

List below the lowest cost of domestic material comparable to each item of nondomestic material shown above, based upon bidder's canvass of domestic suppliers (as required by paragraph (b)(2) on the back of this form).

Name of each item of domestic material comparable to offered nondomestic material	Quantity (weight, feet, no., etc.)	Cost delivered to the job site
	Total	$

16. Bidders furnishing domestic construction material only should disregard this sheet.

List below alternative bid prices based on the use of domestic materials for schedule items under which foreign materials are offered as listed on the enclosed form entitled "Representations by Bidder Pursuant to 'Buy American Act'" (see paragraph at bottom of front page of form).

Item	Work or Material	Quantity and Unit	Unit Price	Amount
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____
____	_____	_____	_____	_____

17. COUNTRY OF MANUFACTURER

The product which the offeror proposes to furnish [ ] is, [ ] is not, manufactured, mined, or grown in the United States. If the product is not manufactured, mined, or grown in the United States, the country of manufacturer is _____.

STANDARD FORM 24
JUNE 1964 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.801

BID BOND

(See Instructions on reverse)

24-103

DATE BOND EXECUTED *(Must not be later than bid opening date)*

PRINCIPAL *(Legal name and business address)*

TYPE OF ORGANIZATION *("X" one)*

☐ INDIVIDUAL ☐ PARTNERSHIP
☐ JOINT VENTURE ☐ CORPORATION

STATE OF INCORPORATION

SURETY(IES) *(Name and business address)*

PENAL SUM OF BOND					BID IDENTIFICATION	
PERCENT OF BID PRICE	AMOUNT NOT TO EXCEED				BID DATE	INVITATION NO.
	MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENTS	FOR *(Construction, Supplies or Services)*	

KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: *Provided*, That, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the bid identified above.

NOW, THEREFORE, if the Principal, upon acceptance by the Government of his bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), shall execute such further contractual documents, if any, and give such bond(s) as may be required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms by him, or in the event of failure so to execute such further contractual documents and give such bonds, if the Principal shall pay the Government for any cost of procuring the work which exceeds the amount of his bid, then the above obligation shall be void and of no effect.

Each Surety executing this instrument hereby agrees that its obligation shall not be impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Government, notice of which extension(s) to the Surety(ies) being hereby waived; provided that such waiver of notice shall apply only with respect to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this bid bond and have affixed their seals on the date set forth above.

PRINCIPAL			
Signature(s)	1. *(Seal)*	2. *(Seal)*	*Corporate Seal*
Name(s) & Title(s) *(Typed)*	1.	2.	

INDIVIDUAL SURETIES		
Signature(s)	1. *(Seal)*	2. *(Seal)*
Name(s) *(Typed)*	1.	2.

CORPORATE SURETY(IES)					
SURETY A	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		

CORPORATE SURETY(IES) (Continued)					
SURETY B	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		
SURETY C	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		
SURETY D	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		
SURETY E	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1	2		
SURETY F	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		
SURETY G	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1.	2.		

INSTRUCTIONS

1. This form is authorized for use whenever a bid guaranty is required in connection with construction work or the furnishing of supplies or services. There shall be no deviation from this form without approval by the Administrator of General Services.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of his authority must be furnished.

3. The penal sum of the bond may be expressed as a percentage of the bid price if desired. In such cases, a maximum dollar limitation may be stipulated (e.g., 20% of the bid price but the amount not to exceed _____ dollars).

4. (a) Corporations executing the bond as sureties must be among those appearing on the Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc) headed "CORPORATE SURETY(IES)", and in the space designated "SURETY(IES)" on the face of this form only the letter identification of the Sureties shall be inserted.

(b) Where individual sureties execute the bond, they shall be two or more responsible persons. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. Such sureties may be required to furnish additional substantiating information concerning their assets and financial capability as the Government may require.

5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal"; and, if executed in Maine or New Hampshire, shall also affix an adhesive seal.

6. The name of each person signing this bid bond should be typed in the space provided.

☆ U.S. Government Printing Office: 1978—261-647/4042

SECTION C

INSTRUCTIONS TO BIDDERS

(CONSTRUCTION CONTRACT)

1. **Explanations to Bidders.**—Any explanation desired by a bidder regarding the meaning or interpretation of the invitation for bids, drawings, specifications, etc., must be requested in writing and with sufficient time allowed for a reply to reach bidders before the submission of their bids. Any interpretation made will be in the form of an amendment of the invitation for bids, drawings, specifications, etc., and will be furnished to all prospective bidders. Its receipt by the bidder must be acknowledged in the space provided on the Bid Form (Standard Form 21) or by letter or telegram received before the time set for opening of bids. Oral explanations or instructions given before the award of the contract will not be binding.

2. **Conditions Affecting the Work.**—Bidders should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Failure to do so will not relieve bidders from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government will assume no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of the contract, unless included in the invitation for bids, the specifications, or related documents.

3. **Bidder's Qualifications.**—Before a bid is considered for award, the bidder may be requested by the Government to submit a statement regarding his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the work.

4. **Bid Guarantee.**—Where a bid guarantee is required by the invitation for bids, failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

A bid guarantee shall be in the form of a firm commitment, such as a bid bond, postal money order, certified check, cashier's check, irrevocable letter of credit or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Bid guarantees, other than bid bonds, will be returned (*a*) to unsuccessful bidders as soon as practicable after the opening of bids, and (*b*) to the successful bidder upon execution of such further contractual documents and bonds (including any necessary coinsurance or reinsurance agreements) as may be required by the bid as accepted.

If the successful bidder, upon acceptance of his bid by the Government within the period specified therein for acceptance (sixty days if no period is specified) fails to execute such further contractual documents, if any, and give such bond(s) (including any necessary coinsurance or reinsurance agreements) as may be required by the terms of the bid as accepted within the time specified (ten days if no period is specified) after receipt of the forms by him, his contract may be terminated for default. In such event he shall be liable for any cost of procuring the work which exceeds the amount of his bid, and the bid guarantee shall be available toward offsetting such difference.

5. **Preparation of Bids.**—(*a*) Bids shall be submitted on the forms furnished, or copies thereof, and must be manually signed. If erasures or other changes appear on the forms, each erasure or change must be initialed by the person signing the bid. Unless specifically authorized in the invitation for bids, telegraphic bids will not be considered.

(*b*) The bid form may provide for submission of a price or prices for one or more items, which may be lump sum bids, alternate prices, scheduled items resulting in a bid on a unit of construction or a combination thereof, etc. Where the bid form explicitly requires that the bidder bid on all items, failure to do so will disqualify the bid. When submission of a price on all items is not required, bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

(*c*) Unless called for, alternate bids will not be considered.

(*d*) Modification of bids already submitted will be considered if received at the office designated in the invitation for bids by the time set for opening of bids. Telegraphic modifications will be considered, but should not reveal the amount of the original or revised bid.

6. **Submission of Bids.**—Bids must be sealed, marked, and addressed as directed in the invitation for bids. Failure to do so may result in a premature opening of, or a failure to open, such bid.

7. **Withdrawal of Bids.**—Bids may be withdrawn by written or telegraphic request received from bidders prior to the time set for opening of bids. (See par. 8 regarding late withdrawals.)

8. **Late Bids, Modifications of Bids, or Withdrawal of Bids.**—(*a*) Any bid received at the office designated in the soliciation after the exact time specified for receipt will not be considered unless it is received before award is made and either:

(1) It was sent by registered or certified mail not later than the fifth calendar day prior to the date specified for the receipt of bids (e.g., a bid submitted in response to a solicitation requiring receipt of bids by the 20th of the month must have been mailed by the 15th or earlier); or

(2) It was sent by mail (or telegram if authorized) and it is determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation.

(*b*) Any modification or withdrawal of a bid is subject to the same conditions as in (a), above. A bid may also be withdrawn in person by a bidder or his authorized representative, provided his identify is made known and he signs a receipt for the bid, but only if the withdrawal is made prior to the exact time set for receipt of bids.

(*c*) The only acceptable evidence to establish:

(1) The date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. Postal Service postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. If neither postmark shows a legible date, the bid, modification, or withdrawal shall be deemed to have been mailed late. (The term "postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed on the date of mailing by employees of the U.S. Postal Service. Therefore, offerors should request the postal clerk to place a hand cancellation bull's-eye "postmark" on both the receipt and the envelope or wrapper.)

(2) The time of receipt at the Government installation is the time-date stamp of such installation on the bid wrapper or other documentary evidence of receipt maintained by the installation.

(*d*) Notwithstanding (a) and (b) of this provision, a late modification of an otherwise successful bid which makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

NOTE: The term "telegram" includes mailgrams.

9. **Public Opening of Bids.**—Bids will be publicly opened at the time set for opening in the invitation for bids. Their content will be made public for the information of bidders and others interested, who may be present either in person or by representative.

10. **Award of Contract.**—(*a*) Award of contract will be made to that responsible bidder whose bid, conforming to the invitation for bids is most advantageous to the Government, price and other factors considered.

(*b*) The Government may, when in its interest, reject any or all bids or waive any informality in bids received.

(*c*) The Government may accept any item or combination of items of a bid, unless precluded by the invitation for bids or the bidder includes in his bid a restrictive limitation.

11. **Contract and Bonds.**—The bidder whose bid is accepted will, within the time established in the bid, enter into a written contract with the Government and, if required, furnish performance and payment bonds on Government standard forms in the amounts indicated in the invitation for bids or the specifications.

BIDDING INFORMATION

I. CONTENTS

This Invitation for Bids, IFB No. DE-FB65-84WP15857 consists of the following documents. These documents are not necessarily contained in the specifications in the order listed hereon but are shown for identification and informational purposes only. All bid submittal documents should be returned when submitting bid.

A. Bid Instruction Documents

1. Invitation for Bids (Standard Form 20), Section A
2. Instruction to Bidders (Standard Form 22), Section C
3. Bidding Information

B. Bid Submittal Documents

1. Bid Form (Standard Form 21), Section E
2. Bid Schedule, Section E
3. Representations and Certifications (Standard Form 19-B), Section B
4. Supplement to Standard Form 19-B, Section B
5. Bid Bond (Standard Form 24)

C. Contract Documents

1. Index of General Provisions (Construction Contract)
2. General Provisions Fixed Price (Construction Contract), Clauses 1 through 79
3. Specifications No. WC-4-15857-116

II. BIDS

Bids shall be submitted in one copy on Standard Form 21, Bid Form, and shall be accompanied by Standard Form 19-B, Supplement to Standard Form 19-B, six pages, a bid guaranty, all in accordance with the instructions listed in paragraph I.A above. If the bid exceeds $25,000, bonds will be submitted as follows:

A. Bid Bonds. Each bidder shall submit with its bid a Bid Bond (Standard Form 24) with good and sufficient surety or sureties acceptable to the Government, or other security as provided in paragraph 4 of Instructions to Bidders (Standard Form 22) in the form of 20 percent of the bid price or $3,000,000.00, whichever is less. The Bid Bond penalty may be expressed in dollars and cents.

B. Performance and Payment Bonds. Within 10 days after the prescribed forms are presented to the bidder to whom award is made for signature, a written contract on the form prescribed by the specifications shall be executed and two bonds, each with good and sufficient

surety or sureties acceptable to the Government, furnished; namely, a Performance Bond (Standard Form 25) and a Payment Bond (Standard Form 25-A). The penal sums of such bond will be as follows:

1. Performance Bond. The penal sum of the performance bond shall be equal to 100 percent of the contract price.

2. Payment Bond.

   a. When the contract price is $1 million or less, the penal sum shall be 50 percent of the contract price.

   b. When the contract price is in excess of $1 million but not more than $5 million, the penal sum shall be 40 percent of the contract price.

   c. When the contract price is more than $5 million, the penal sum shall be $2.5 million.

Any bonds furnished will be furnished by the Contractor to the Government prior to commencement of contract performance.

III. All hand-delivered bids must be delivered to the Department of Energy, Western Area Power Administration, Room 300, Federal Building, 200 Fourth Street, S.W., Huron South Dakota 57350.
Any bids submitted by hand after the time set for receipt will not be accepted.

NOTICE OF CONTRACT PAYMENT METHODS

Payments for amounts invoiced under an award, if any, resulting from this solicitation will be made either by check or by electronic funds transfer. The latter will be made through the Treasury Financial Communications System (TFCS) to a designated financial institution. The Government will determine the method of payment at the time of payment in accordance with applicable Department of Treasury requirements.

Under the TFCS, payments can be made to financial institutions that have access to the Federal Reserve Communications Systems (FRCS) or to financial institutions that do not have access to the FRCS, through correspondent financial institutions or Federal Reserve Banks. TFCS payments will be accompanied by information messages regarding the invoice being paid and the Contractor's account number at the financial institution.

Upon receipt of an award, a successful contractor will be required to provide certain payee bank account information needed for the making of TFCS payments. Refer to contract clause "Payment Methods."

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

(EXECUTIVE ORDER 11246)

1. The offeror's or bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

Goals and Timetables for Female Utilization

Timetable	Goals (percent)
From April 1, 1978 until March 31, 1979	3.1
From April 1, 1979 until March 31, 1980	5.0
From April 1, 1980 until March 31, 1981	6.9

Goals and Timetables for Minority Utilization

Timetable	Trade	Goals (percent)
Until further notice	All trades	13 to 14

In the event that any work which is subject to these goals is performed in a year later than the latest year for which goals of female and minority participation have been established, the goals for the last year listed will be applicable to such work.

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR part 60-4 shall be based on its implementation of the "Equal Opportunity" clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade; and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or

trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the sub-Contractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this notice, and in the contract resulting from this solicitation, the "covered area" for female utilization is nationwide and for minority utilization is the State of Montana.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY

CONSTRUCTION CONTRACTS

(EXECUTIVE ORDER 11246)

1. As used herein:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the "Equal Opportunity" clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in subparagraphs 7.a. through p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization, and the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with

these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligations to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7.b. above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy

with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any jobsite. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations; to schools with minority and female students; and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than 1 month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contractors and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assists in fulfilling one or more of their affirmative action obligations (7.a. through p.). The efforts of a Contractor association, joint Contractor-union, Contractor-community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7.a. through p. of these specifications: Provided, that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work-force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the "Equal Opportunity" clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to

achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the director shall proceed in accordance with 42 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provision hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; Contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN (ADVERTISED)

1. This provision does not apply to small business concerns.

2. The term "subcontract" means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for the performance of the original contract or subcontract.

3. The bidder acknowledges that it is aware of the subcontracting plan requirement in this provision; and if selected for award, will submit within the time specified by the contracting officer a subcontracting plan that will afford the maximum practicable opportunity to participate in the performance of the contract to small and small disadvantaged concerns and will include:

a. Percentage goals (expressed in terms of percentage of total planned subcontracting dollars) for the utilization as subcontractors of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals; (For the purposes of the subcontracting plan, the Contractor may include all purchases which contribute to the performance of the contract, including a proportionate share of products, services, etc., whose costs are normally allocated as indirect or overhead costs.)

As part of its establishment of percentage goals the apparent successful bidder shall also include in its subcontracting plan:

(1) A statement of: (a) total dollars planned to be subcontracted; (b) total dollars planned to be subcontracted to small business; and (c) total dollars planned to be subcontracted to small disadvantaged business.

(2) A description of the principal product and service areas to be subcontracted and an identification of those areas where it is planned to use (i) small business subcontractors, and (ii) small disadvantaged business subcontractors.

b. The name of an individual within the employ of the bidder who will administer the bidder's subcontracting program and a description of the duties of such individual;

c. A description of the efforts the bidder will take to assure that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals will have an equitable opportunity to compete for subcontracts;

d. Assurances that the bidder will include the clause entitled Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals in all subcontracts which offer further subcontracting opportunities and to require all subcontractors (except small business concerns) which receive subcontracts

in excess of $500,000, or in the case of a contract for the construction of any public facility, $1,000,000, to adopt and comply with a plan similar to the plan agreed to by the bidder;

e. Assurances that the bidder will submit such periodic reports and cooperate in any studies or surveys as may be required by the contracting agency or the Small Business Administration in order to determine the extent of compliance by the bidder with the subcontracting plan; and

f. A recitation of the types of records the successful bidder will maintain to demonstrate procedures which have been adopted to comply with the requirements and goals set forth in the plan, including the establishment of source lists of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals; and efforts to identify and award subcontracts to such small business concerns. The records shall include at least the following (these records may be maintained on a plant-wide or company-wide basis unless otherwise indicated):

(1) Small and disadvantaged business source lists, guides and other data identifying small and small disadvantaged business vendors.

(2) Organizations contacted for small and disadvantaged business sources.

(3) On a cont basis, records on all subcontract solicitations over $100,000, indicating on each solicitation (a) whether small business was solicited, and if not why not; (b) whether small disadvantaged business was solicited, and if not why not; and (c) reasons for the failure of solicited small business or small disadvantaged business to receive the subcontract award.

(4) Records to support other outreach efforts:

- Contacts with minority and small business trade associations;
- Contact with business development organizations;
- Attendance at small and minority business procurement conferences and trade fairs.

(5) Records to support internal activities to guide and encourage buyers:

- Workshops, seminars, training programs,
- Monitoring activities to evaluate compliance.

(6) On a contract-by-contract basis, records to support award data submitted to the Government to include name and address of subcontractor.

4. The bidder understands that:

(a) It agrees to carry out the government's policy to provide the maximum practicable opportunity for small business concerns and small

business concerns owned and controlled by socially and economically disadvantaged individuals to participate in the performance of the contract, consistent with its efficient performance.

(b) If it does not submit a subcontracting plan within the time limits prescribed by the contracting agency, it will be ineligible to be awarded the contract.

(c) Prior compliance of the bidder with other such subcontracting plans under previous contracts will be considered by the contracting officer in determining the responsibility of the offeror for award of the contract.

(d) It is the bidder's responsibility to develop a subcontracting plan with respect to both small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals and that each such aspect of the plan will be judged independently of the other.

5. The failure of any Contractor or subcontractor to comply in good faith with (a) the clause entitled Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals or (b) the terms of any subcontracting plan required by this Small Business and Small Disadvantaged Business Subcontracting Plan (Advertised) provision, will be a material breach of the contract or subcontract.

6. Commercial Products. If a commercial product (defined below) is offered the required subcontracting plan may relate to the company's or division's production generally (both for commercial and noncommercial products) rather than solely to the item being procured under the government contract. In such cases, the Contractor shall be required to submit one company-wide, annual plan to be reviewed for approval by the first agency with which it enters into a prime contract (which requires a subcontracting plan) during the fiscal year, or by another agency satisfactory to the contracting officer. The approved plan will remain in effect for the company's entire fiscal year for all of the company's or division's commercial products.

The term "commercial products" means products in regular production sold in substantial quantities to the general public and/or industry at establish market or catalog prices. A product which, in the opinion of the contracting officer, differs only insignificantly from the Contractor's commercial product may be regarded for the purpose of this clause as a commercial product.

STANDARD FORM 23
JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

CONSTRUCTION CONTRACT

(See instructions on reverse)

CONTRACT NO.

DATE OF CONTRACT

NAME AND ADDRESS OF CONTRACTOR

CHECK APPROPRIATE BOX

- ☐ Individual
- ☐ Partnership
- ☐ Joint Venture
- ☐ Corporation, incorporated in the State of _____.

DEPARTMENT OR AGENCY

CONTRACT FOR (*Work to be performed*)

PLACE

CONTRACT PRICE (*Express in words and figures*)

ADMINISTRATIVE DATA (*Optional*)

The United States of America (hereinafter called the Government), represented by the Contracting Officer executing this contract, and the individual, partnership, joint venture, or corporation named above (hereinafter called the Contractor), mutually agree to perform this contract in strict accordance with the General Provisions (Standard Form 23-A), Labor Standards Provisions Applicable to Contracts in Excess of $2,000 (Standard Form 19-A), and the following designated specifications, schedules, drawings, and conditions:

WORK SHALL BE STARTED	WORK SHALL BE COMPLETED

Alterations. The following alterations were made in this contract before it was signed by the parties hereto:

In witness whereof, the parties hereto have executed this contract as of the date entered on the first page hereof.

THE UNITED STATES OF AMERICA

By _____

_____
(Official title)

CONTRACTOR

_____
(Name of Contractor)

By _____
(Signature)

_____
(Title)

INSTRUCTIONS

1. The full name and business address of the Contractor must be inserted in the space provided on the face of the form. The Contractor shall sign in the space provided above with his usual signature and typewrite or print his name under the signature.

2. An officer of a corporation, a member of a partnership, or an agent signing for the Contractor shall place his signature and title after the word "By" under the name of the Contractor. A contract executed by an attorney or agent on behalf of the Contractor shall be accompanied by two authenticated copies of his power of attorney or other evidence of his authority to act on behalf of the Contractor.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1981—341-526:7077

STANDARD FORM 25
JUNE 1967 EDITION
GENERAL SERVICES ADMINISTRATION
FED PROC REG (41 CFR) 1-16.801

PERFORMANCE BOND

(See Instructions on reverse)

DATE BOND EXECUTED *(Must be same or later than date of contract)*

PRINCIPAL *(Legal name and business address)*

TYPE OF ORGANIZATION *("X" one)*

☐ INDIVIDUAL ☐ PARTNERSHIP
☐ JOINT VENTURE ☐ CORPORATION

STATE OF INCORPORATION

SURETY(IES) *(Name(s) and business address(es))*

PENAL SUM OF BOND

MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENT(S)

CONTRACT DATE	CONTRACT NO

KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: *Provided*, That, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into the contract identified above;

NOW, THEREFORE, if the Principal shall:

(a) Perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Government, with or without notice to the Surety(ies), and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety(ies) being hereby waived; and

(b) If the said contract is subject to the Miller Act, as amended (40 U.S.C. 270a-270e), pay to the Government the full amount of the taxes imposed by the Government which are collected, deducted, or withheld from wages paid by the Principal in carrying out the construction contract with respect to which this bond is furnished; then the above obligation shall be void and of no effect.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this performance bond and have affixed their seals on the date set forth above.

PRINCIPAL

Signature(s)	1. *(Seal)*	2. *(Seal)*	*Corporate Seal*
Name(s) & Title(s) *(Typed)*	1.	2	

INDIVIDUAL SURETY(IES)

Signature(s)	1. *(Seal)*	2 *(Seal)*
Name(s) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	Name & Address		STATE OF INC	LIABILITY LIMIT
	Signature(s)	1.	2	*Corporate Seal*
	Name(s) & Title(s) *(Typed)*	1.	2.	

25-105

CORPORATE SURETY(IES) (Continued)					
SURETY B	Name & Address		STATE OF INC	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1	2		
	Name(s) & Title(s) *(Typed)*	1	2		
SURETY C	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1	2		
	Name(s) & Title(s) *(Typed)*	1	2		
SURETY D	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal.*
	Signature(s)	1	2.		
	Name(s) & Title(s) *(Typed)*	1	2.		
SURETY E	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1	2.		
	Name(s) & Title(s) *(Typed)*	1	2		
SURETY F	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1	2.		
SURETY G	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2.		
	Name(s) & Title(s) *(Typed)*	1	2.		

BOND PREMIUM ▶	RATE PER THOUSAND $	TOTAL $

INSTRUCTIONS

1. This form is authorized for use in connection with contracts for construction work or the furnishing of supplies or services. There shall be no deviation from this form without approval by the Administrator of General Services.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of his authority must be furnished.

3. (a) Corporations executing the bond as sureties must be among those appearing on the Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)", and in the space designated "SURETY(IES)" on the face of this form only the letter identification of the Sureties shall be inserted.

(b) Where individual sureties execute the bond, they shall be two or more responsible persons. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. Such sureties may be required to furnish additional substantiating information concerning their assets and financial capability as the Government may require.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal"; and, if executed in Maine or New Hampshire, shall also affix an adhesive seal.

5. The name of each person signing this performance bond should be typed in the space provided.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1977 O - 241-530 (3250)

STANDARD FORM 25-A
JUNE 1964 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.801

PAYMENT BOND

(See Instructions on reverse)

25-203

DATE BOND EXECUTED *(Must be same or later than date of contract)*

PRINCIPAL *(Legal name and business address)*

TYPE OF ORGANIZATION *("X" one)*

☐ INDIVIDUAL ☐ PARTNERSHIP

☐ JOINT VENTURE ☐ CORPORATION

STATE OF INCORPORATION

SURETY(IES) *(Name(s) and business address(es))*

PENAL SUM OF BOND

MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENT(S)

CONTRACT DATE

CONTRACT NO.

KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: *Provided*, That, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into the contract identified above;

NOW, THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety(ies) being hereby waived, then the above obligation shall be void and of no effect.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this payment bond and have affixed their seals on the date set forth above.

PRINCIPAL

Signature(s)	1. *(Seal)*	2 *(Seal)*	*Corporate Seal*
Name(s) & Title(s) *(Typed)*	1.	2	

INDIVIDUAL SURETY(IES)

Signature(s)	1. *(Seal)*	2. *(Seal)*
Name(s) *(Typed)*	1	2.

CORPORATE SURETY(IES)

SURETY A	Name & Address		STATE OF INC.	LIABILITY LIMIT	
	Signature(s)	1.	2		*Corporate Seal*
	Name(s) & Title(s) *(Typed)*	1.	2		

CORPORATE SURETY(IES) (Continued)					
SURETY B	Name & Address		STATE OF INC	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1	2		
SURETY C	Name & Address		STATE OF INC	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1.	2		
SURETY D	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1.	2		
SURETY E	Name & Address		STATE OF INC.	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1.	2		
SURETY F	Name & Address		STATE OF INC	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1.	2.		
SURETY G	Name & Address		STATE OF INC	LIABILITY LIMIT	*Corporate Seal*
	Signature(s)	1.	2		
	Name(s) & Title(s) *(Typed)*	1.	2		

INSTRUCTIONS

1. This form, for the protection of persons supplying labor and material, shall be used whenever a payment bond is required under the act of August 24, 1935, 49 Stat. 793, as amended (40 U.S.C. 270a–270e). There shall be no deviation from this form without approval by the Administrator of General Services.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of the form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of his authority must be furnished.

3. (a) Corporations executing the bond as sureties must be among those appearing on the Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)", and in the space designated "SURETY(IES)" on the face of this form only the letter identification of the Sureties shall be inserted.

(b) Where individual sureties execute the bond, they shall be two or more responsible persons. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. Such sureties may be required to furnish additional substantiating information concerning their assets and financial capability as the Government may require.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal"; and, if executed in Maine or New Hampshire, shall also affix an adhesive seal.

5. The name of each person signing this payment bond should be typed in the space provided.

☆U.S.GPO:1979-0-281-187/5017

SECTION D

EVALUATION AND AWARD CRITERIA

D-1. Evaluation of Offer

Award of any contract resulting from this solicitation shall be made to the lowest priced, responsive, responsible offeror who meets the requirements of the specification(s) No. WC-4-15857-116 .

PREVIOUS EDITION NOT USEABLE

BID FORM
(Construction Contract)

1. REFERENCE (Project/Solicitation Number) *(Include on correspondence)*
Invitation for Bid
DE-FB65-84WP15857

2. *Read the instructions to Bidders (Standard Form 22).*
Submit original and ~~xxxxxxx~~ signed ~~copies of this~~ form.

3. DATE OF INVITATION
**

4. NAME AND LOCATION OF PROJECT
Fort Peck-Havre 230-kV
Transmission Line
Hill, Blaine, Phillips, Valley,
and McCone Counties, Montana

5. BIDDER'S NAME AND ADDRESS *(Include ZIP Code) (Type or print)*
*

6. TELEPHONE NO. *(Include Area Code)*
*

7. DATE
*

8. MAIL BID TO:
DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

In compliance with the above-dated invitation for bids, the undersigned hereby proposes to perform all work for Specification WC-4-15857-116

in strict accordance with the General Provisions (~~Standard Form 23-A, Labor Standards Provisions Applicable to Contracts in Excess of $2,000 (Standard Form 19-A)~~) specifications, schedules, drawings, and conditions, for the following amount(s): Set forth in Section E - Bidding Schedule

*To be filled in by bidder
**Not necessary for bidder to fill in

Each Contractor receiving an award over $10,000 will be requested to identify its Principal Place of Performance and furnish its DUNS number if one has been assigned.

PRINCIPAL PLACE OF PERFORMANCE _____

DUNS NUMBER _____

The undersigned agrees that, upon written acceptance of this bid, mailed or otherwise furnished within_____ calendar days* after the date of opening of bids (unless a different period is inserted by the bidder), bidder will, within 15 calendar days after receipt of the prescribed forms (unless a longer period is allowed), execute Standard Form 23, Construction Contract, and give performance and payment bonds, as required**, on Government standard forms with good and sufficient surety. The undersigned further agrees that, when reinsurance agreements are contemplated, all necessary reinsurance agreements will be on Government forms and will be executed and submitted with the bonds. However, when an additional period of_____ days (not to exceed 45 calendar days) is authorized by the procuring activity, reinsurance agreements may be submitted within such period after the execution of the bond.

The undersigned agrees, if awarded the contract, to commence the work within 30 calendar days after the date of receipt of notice to proceed, and to complete the work within *** calendar days after the date of receipt of notice to proceed. ***See paragraph 1.1.3 of the technical specifications.

*Bids acceptance period. Bids offering less than 60 days for acceptance by the Government from the date set for opening will be considered nonresponsive and will be rejected.

**Performance and payment bonds shall be furnished when (1) the contract award resulting from this bid exceeds $25,000, or (2) bonds are specifically required by the Invitation for Bids (Standard Form 20).

RECEIPT OF AMENDMENTS. *The undersigned acknowledges receipt of the following amendments of the invitation for bids, drawings, and/or specifications, etc. (Give number and date of each.)*

* AMENDMENT NO.						
DATE						
AMENDMENT NO.						
DATE						

The representations and certifications on the accompanying STANDARD FORM 19-B are made a part of this bid.

ENCLOSED IS BID GUARANTEE, CONSISTING OF	IN THE AMOUNT OF
*	$ *

NAME OF BIDDER *(Type or print)*	FULL NAME OF ALL PARTNERS *(Type or print)*
*	
BUSINESS ADDRESS *(Type or print) (Include ZIP Code)*	
BY *(Signature in ink. Type or print name under signature)*	
TITLE *(Type or print)*	

DIRECTIONS FOR SUBMITTING BIDS: *Envelopes containing bids, guarantee, etc., must be sealed, marked, and addressed as follows:*

Address to Department of Energy, Western Area Power Administration Office indicated in the solicitation as the office receiving bids. The following properly filled out bid identification must be placed on the left side of the envelope containing the bid: BID for (INVITATION FOR BID NO. _____), To be opened (Time and date of opening), BID of (Name of bidder).

CAUTION—*Bids should not be qualified by exceptions to the bidding conditions.* **STANDARD FORM 21 BACK** (REV. 9-81)

☆U.S.GPO:1982-0-361-526/7474

SECTION E

SUPPLIES/SERVICES AND PRICES BID FORM

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

FORT PECK-HAVRE
230-KV TRANSMISSION LINE

SCHEDULE - PART A

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
1.	Mobilization and preparatory work	For a lump sum not to exceed 5 percent of total of this Schedule		$_____
2.	Removing existing transmission line	For the lump sum of		$_____
3.	Clearing right-of-way	For the lump sum of		$_____
4.	Corrugated metal pipe culverts, 24-inch diameter	25 feet	$_____	$_____
5.	Corrugated metal pipe culverts, 30-inch diameter	175 feet	$_____	$_____
6.	Barbed-wire gates on right-of-way	300 gates	$_____	$_____
7.	Barbed-wire gates off right-of-way	55 gates	$_____	$_____
8.	Prefabricated steel gates	30 gates	$_____	$_____
	Furnish and constructing structures with Class 2 poles and maximum pole lengths as follows:			
	Type HBS structures			
9.	55-foot pole	10 structures	$_____	$_____
10.	60-foot pole	51 structures	$_____	$_____
11.	65-foot pole	108 structures	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
12.	70-foot pole	193 structures	$_____	$_____
13.	75-foot pole	258 structures	$_____	$_____
14.	80-foot pole	444 structures	$_____	$_____
15.	85-foot pole	40 structures	$_____	$_____
	Type HSB-1 structures			
16.	85-foot pole	111 structures	$_____	$_____
17.	90-foot pole	38 structures	$_____	$_____
18.	95-foot pole	18 structures	$_____	$_____
19.	100-foot pole	5 structures	$_____	$_____
20.	105-foot pole	2 structures	$_____	$_____
	Type HSB-2 structures			
21.	95-foot pole	1 structure	$_____	$_____
	Type HSB-3 structures			
22.	65-foot pole	1 structure	$_____	$_____
23.	70-foot pole	3 structures	$_____	$_____
24.	75-foot pole	7 structures	$_____	$_____
25.	80-foot pole	6 structures	$_____	$_____
	Type 3A-1 structures			
26.	65-foot pole	1 structure	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
27.	70-foot pole	1 structure	$	$
28.	75-foot pole	1 structure	$	$
29.	80-foot pole	2 structures	$	$
30.	85-foot pole	2 structures	$	$
31.	90-foot pole	2 structures	$	$
	Type 3A-2 structures			
32.	60-foot pole	1 structure	$	$
	Type 3A-3 structures			
33.	60-foot pole	1 structure	$	$
34.	70-foot pole	4 structures	$	$
35.	75-foot pole	8 structures	$	$
36.	80-foot pole	8 structures	$	$
37.	90-foot pole	1 structure	$	$
38.	100-foot pole	1 structure	$	$
	Type 3A-4 structures			
39.	60-foot pole	1 structure	$	$
40.	70-foot pole	4 structures	$	$
41.	75-foot pole	2 structures	$	$
42.	85-foot pole	1 structure	$	$

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
43.	90-foot pole	1 structure	$_____	$_____
44.	95-foot pole	2 structures	$_____	$_____
	Type 3AB-2 structures			
45.	85-foot pole	1 structure	$_____	$_____
	Type 3AB-3 structures			
46.	85-foot pole	2 structures	$_____	$_____
	Type 3AC-1 structures			
47.	70-foot pole	1 structure	$_____	$_____
	Type 3AC-2 structures			
48.	65-foot pole	2 structures	$_____	$_____
49.	70-foot pole	4 structures	$_____	$_____
50.	75-foot pole	3 structures	$_____	$_____
51.	80-foot pole	4 structures	$_____	$_____
52.	85-foot pole	1 structure	$_____	$_____
	Type 3AC-3 structures			
53.	70-foot pole	2 structures	$_____	$_____
54.	75-foot pole	1 structures	$_____	$_____
55.	80-foot pole	4 structures	$_____	$_____
56.	85-foot pole	1 structure	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
57.	90-foot pole	1 structure	$_____	$_____
	Type 3AC-4 structures			
58.	80-foot pole	1 structure	$_____	$_____
	Type 3TA-1 structures			
59.	60-foot pole	1 structure	$_____	$_____
60.	65-foot pole	2 structures	$_____	$_____
61.	70-foot pole	3 structures	$_____	$_____
62.	75-foot pole	1 structure	$_____	$_____
63.	80-foot pole	3 structures	$_____	$_____
64.	85-foot pole	4 structures	$_____	$_____
65.	90-foot pole	1 structure	$_____	$_____
66.	95-foot pole	1 structure	$_____	$_____
	Type 3TA-2 structures			
67.	80-foot pole	2 structures	$_____	$_____
68.	85-foot pole	1 structure	$_____	$_____
69.	90-foot pole	2 structures	$_____	$_____
	Type 3TA-4 structures			
70.	75-foot pole	1 structure	$_____	$_____
71.	80-foot pole	1 structure	$_____	$_____
	Type 3TA-5 structures			
72.	75-foot pole	1 structure	$_____	$_____
73.	80-foot pole	2 structures	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
74.	90-foot pole	1 structure	$_____	$_____
	Type 3TA-6 structures			
75.	75-foot pole	1 structure	$_____	$_____
	Type 3TA-7 structures			
76.	60-foot pole	1 structure	$	$
77.	70-foot pole	2 structures	$_____	$_____
78.	80-foot pole	4 structures	$_____	$_____
79.	85-foot pole	2 structures	$_____	$_____
80.	90-foot pole	2 structures	$_____	$_____
	Type 3TA-8 structures			
81.	80-foot pole	2 structures	$_____	$_____
82.	Guy protectors	96 protectors	$_____	$_____
83.	Bog shoes	18 shoes	$_____	$_____
84.	Bog anchors	6 anchors	$_____	$_____
85.	Special pole foundations	6 foundations	$_____	$_____
	Insulator assemblies for 954,000-circular mil, ACSR, 45/7 conductor as follows:			
86.	Single-string suspension-type with 12 insulator units per assembly	3888 assemblies	$_____	$_____
87.	Single-string suspension-type with 13 insulator units per assembly	75 assemblies	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
88.	Single-string suspension-type with yoke plate, two suspension clamps and 13 insulator units per assembly	135 assemblies	$_____	$_____
89.	Single-string tension-type with 13 insulator units per assembly	246 assemblies	$_____	$_____
90.	Line post insulator assembly with clamp suitable for 954,000-circular mil, ACSR, 45/7 conductor	84 assemblies	$_____	$_____
91.	Additional work and materials required for stringing adjacent to existing energized transmission lines	95 miles	$_____	$_____
92.	Stringing three 954,000-circular mil, ACSR, 45/7 nonspecular conductors	179.3 miles	$_____	$_____
93.	Stringing two 3/8-inch diameter high-strength steel, 7-strand overhead ground wires	179.3 miles	$_____	$_____
94.	Attaching stockbridge-type vibration dampers directly to 954,000-circular mil, ACSR conductors	4230 dampers	$_____	$_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SCHEDULE-PART A - Continued

Item No.	Work or Material	Estimated Quantity and Unit	Unit Price	Amount
	Attaching vibration dampers directly to 3/8-inch high strength, 7-strand overhead ground wires			
95a.	Stockbridge type*	5640 dampers		
	or		*$_____	$_____
95b.	Preformed type*	11280 dampers		
96.	Fence grounds for non-electric fences	1500 fence grounds	$_____	$_____
97.	Hold down weights, 100 pound	9 weights	$_____	$_____
98.	Furnishing and installing all materials necessary to complete installation of approach spans leading into and out of of the various substations	For the lump sum of		$_____

*The contractor has the option of furnishing either stockbridge or preformed type vibration dampers and shall insert only one unit price and amount which is for the type to be furnished.

TOTAL FOR THE SCHEDULE $_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. WC-4-15857-116

SECTION E
SCHEDULE-PART B

Bids must be entered for all items. Award of a contract will be made to only one Contractor. The Government reserves the right to make award for any or all items of any bid, unless the bidder qualifies such bid by specific limitation. The Government also reserves the right to make award to the bidder whose aggregate bid on any combination of bid items is low.

The Government further reserves the right to increase or decrease the quantity of any unit price item no more than 15 percent per item, at no change in the unit price specified by the bidder. All extensions of unit-priced items will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.

If a modification to a bid based on unit prices is submitted, which provides for a lump-sum adjustment to the total estimated cost, the application of the lump-sum adjustment to each unit price in the bid schedule must be stated. If it is not stated, the bidder agrees that the lump-sum adjustment shall be applied on a pro-rata basis to every unit price in the bid schedule.

When alternate items and/or performance schedules are set forth in this solicitation, the Government reserves the right to make award of the alternate items and/or performance schedule when price and other factors considered, it is determined that the alternate items and/or performance is in the best interest of the Government.

SECTION F

SPECIFICATIONS, STANDARDS, AND DESCRIPTIONS

F-1. Specifications, Standards, and Descriptions

All supplies/services provided for under this contract shall be in accordance with the specifications included herein and contained immediately after Section M. Applicable technical specifications are numbered WC-4-15857-116 and contain applicable drawings.

SECTION G

PRESERVATION, PACKAGING, AND PACKING

G-1. Preservation, Packaging, and Packing

Preservation, packaging and packing, and identification marking shall be in accordance with the specifications, standards, and descriptions set forth in Section F above.

SECTION H

DELIVERY

H-1. Time of Delivery

Performance of work shall be in accordance with the performance periods established in Specification No. WC-4-15857-116 (paragraph 1.1.3 entitled "Commencement, Prosecution, and Completion of Work").

SECTION I

INSPECTION AND ACCEPTANCE

I-1. Inspection and Acceptance

Inspection and acceptance of the supplies or service to be furnished hereunder shall be made by:

Assistant Area Manager for Construction
Huron Construction Office
P.O. Box 921
Huron, South Dakota 57350

SECTION J

SPECIAL PROVISIONS
CONSTRUCTION CONTRACTS

1. LIQUIDATED DAMAGES

In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or any extensions thereof, the Contractor shall pay to the Government as fixed, agreed, and liquidated damages, pursuant to the clause of this contract entitled "Termination for Default-Damages for Delay-Time Extensions," the sum of $1,500.00 for each calendar day of delay.

The clause entitled "Progress Charts and Requirements for Overtime Work" of the General Provisions requires the Contractor to submit progress charts to the Contracting Officer for approval. Timely submittal of the progress chart and timely revisions thereto are important. The Government must have the information contained in the progress chart for such purposes as scheduling the preparation of additional drawings required for construction, delivery of Government-furnished materials and equipment, and scheduling services of inspectors and survey crews. Accordingly, the Contractor will be assessed as fixed, agreed, and liquidated damages the sum of $ 50.00 per day for each calendar day's delay the Contractor's original progress chart is late. Further, should the Contracting Officer notify the Contractor in writing that a revision of the progress chart is required, liquidated damages in the amount of $ 50.00 per day will be assessed for each calendar day beyond 30 calendar days, after receipt of such notification that the Contractor fails to submit the required revision.

2. PERFORMANCE OF WORK BY CONTRACTOR

The Contractor shall perform on the site and with its own organization work equivalent to at least 20 percent of the total amount of work to be performed under the contract. If, during the progress of the work hereunder, the Contractor requests a reduction in such percentage and the Contracting Officer determines that it would be to the advantage of the Government, the percentage of the work required to be performed by the Contractor may be reduced with the written approval of the Contracting Officer.

The cost of Contractor material and equipment incorporated in the work shall not be included in computing the total amount of construction work at the site.

3. LIMITATION OF GOVERNMENT'S OBLIGATION

a. Of the total price of item(s) 1 through 98, the sum of $ 7,000,000 is presently available and will be obligated at

time of contract award for payment and contract. It is anticipated that funds will be allotted to this contract and obligated by contract amendment in accordance with the following schedule.

Fiscal Year	Percent of Bid
1985	Balance

The expected rate of funding shown herein is provided solely for informational purposes. The Contractor is cautioned that any schedule of operations which contemplates a different rate of funding is its own responsibility.

b. The Contractor agrees to perform or have performed work on said items up to the point at which, in the event of termination of this contract pursuant to the clause hereof entitled "Termination for Convenience of the Government," the total amount payable by the Government (including amounts payable in respect of subcontracts and settlement costs), pursuant to paragragh (e) thereof, would in the exercise of reasonable judgment by the Contractor approximate the total amount at the time allotted to the contract. The Government shall not be obligated in any event to pay or reimburse the Contractor in excess of the amount allotted to the contract, anything to the contrary in the clause hereof entitled "Termination for Convenience of the Government" notwithstanding.

c. It is contemplated that funds presently allotted to this contract will cover the work to be performed until September 30, 1984. In the event funds allotted are considered by the Contractor to be inadequate to cover the work to be performed until the above date, or an agreed date in substitution thereof, the Contractor shall notify the Contracting Officer in writing when within the next 30 days the work will reach a point at which, in the event of termination of this contract pursuant to the clause hereof entitled "Termination for Convenience of the Government," the total amount payable by the Government (including amounts payable in respect of subcontracts and settlement costs) pursuant to paragraph e. thereof, will approximate 85 percent of the total amount then allotted to the contract. The notice shall state the estimated date when such point will be reached and the estimated amount of additional funds required to continue performance to the above or an agreed substituted date. The Contractor shall, 30 days prior to the date above the written or agreed substituted date, advise the Contracting Officer in writing as to the estimated amount of additional funds which will be required for the timely performance of the contract for further period, as may be specified in the contract or otherwise agreed to by the parties. If after such latter notification, additional funds are not allotted by the date above or by an agreed date in substitution thereof, the Contracting Officer will, upon written request of the Contractor, terminate this contract on such date or the date set forth in the request, whichever is later, pursuant to the provisions of the clause of this contract entitled "Termination for Convenience of the Government."

d. When additional funds are allotted for continued performance of the work under this contract, the parties shall agree on the applicable period of contract performance which shall be covered by such funds. The provisions of paragraphs b. and c. above shall apply to such additional allotted funds and substituted date pertaining thereto and the contract amended accordingly.

e. If the Contractor is delayed in the performance of the work under this contract, solely by reason of the failure of the Government to allot additional funds in amounts sufficient for the timely performance of this contract; and, if additional funds are allotted, an equitable adjustment shall be made in the performance time. Failure to agree to any such equitable adjustment hereunder shall be a dispute concerning a question of fact within the meaning of the clause in this contract entitled "Disputes."

f. The Government may at any time prior to termination, and with the consent of the Contractor after notice of termination, allot additional funds for this contract.

g. Nothing in this clause shall affect the right of the Government to terminate this contract pursuant to the clause of this contract entitled "Termination for Convenience of the Government."

4. BACKCHARGES TO CONTRACTOR

Where this contract provides for charges to the Contractor for costs incurred by the Government for services, materials, or use of equipment, such charges will include the costs of labor and materials, a reasonable allowance for use of plant and equipment, and other expenditures which can be directly assigned to the services or materials furnished, plus 15 percent of such total costs for Government overhead.

In the event of termination of the contract for default under the clause of this contract entitled "Termination for Default - Damages for Delay - Time Extensions," the increased costs occasioned by the Government thereunder shall include those administrative costs which are necessary for and directly assignable to completing the work following such termination and which would not have been required had termination not been necessary. In addition, the Government shall be entitled to 15 percent of the total of such administrative costs for Government overhead.

5. RIGHT TO OPERATE AND USE UNSATISFACTORY MATERIALS AND EQUIPMENT

If, after installation, the operation or use of the materials or equipment furnished by the Contractor fails to comply with the specifications of this contract, the Government shall have the right to operate or use such materials or equipment until correction of defects, errors, or omissions, by repair or by partial or complete replacement, can be made without interferring with Government operations.

6. PROGRESS PAYMENTS

a. Retained Percentages. Pursuant to clause entitled "Payments to Contractor" of the General Provisions, when 25 percent of the work has been completed, the Contracting Officer will make his or her initial determination as to satisfactory progress and may then waive retainage from subsequent progress payments and may reduce the retainage to an amount equal to 2.5 percent of the total bid for all schedules of the contract as awarded. After 75 percent of all work originally contemplated has been completed, with satisfactory progress being maintained, the Contracting Officer may reduce the retainage to an amount equal to 1.5 percent of the total bid for all schedules of the contract as awarded, which amount may be further reduced after substantial completion of all work under the contract.

Reduction of retained percentages is at the sole discretion of the Contracting Officer and shall not be interpreted as creating a contractual right to such reduction.

b. Payment for Materials. Estimates for progress payments, as provided in clause entitled "Payments to Contractor" of the General Provisions, will include items of materials delivered on the site which will become a part of the finished construction work and for which the Contractor presents satisfactory evidence that it has acquired title to such materials. Invoices receipted by the supplier showing that payment in full has been made, or certificates from both the Contractor and the supplier warranting that full title to the materials is vested in the Contractor that the materials are free of liens and encumbrances, will be accepted as satisfactory evidence that the Contractor has acquired title to the materials.

7. PAYMENT METHODS

a. Payments due for amounts properly invoiced in accordance with the terms and conditions specified elsewhere in the contract shall be made either by Treasury check(s) payable to the Contractor or by electronic funds transfer(s) to a financial institution designated by the Contractor. The method of payment shall be determined by the Government at the time of payment in accordance with applicable Department of Treasury requirements.

b. After award but no later than fourteen (14) days before an invoice or bill is submitted for payment, the Contractor shall designate a financial institution for the receipt of electronic funds transfer payments hereunder; and provide the appropriate Government representative (Contracting Officer or finance official as determined by the Government) with the name of the designated financial institution, financial institutions's or correspondent financial institution's 9-digit American Banker Association identifying number, telegraphic abbreviation of such financial institution, and account number at the designated financial institution to be credited with the funds.

c. In the event the Contractor during the performance of this contract elects to designate a different financial institution for the receipt of any payment made using electronic funds transfer procedures, notification of such change and the information as specified in paragraph (b) above must be received by the appropriate Government representative thirty (30) days prior to the date such change is to become effective.

d. Contractor failure to properly designate a financial institution or to provide appropriate payee bank account information may delay payments of amounts otherwise prorerly due.

8. GOVERNMENT INSPECTION OF MATERIALS

Materials furnished by the Contractor which will become a part of the completed construction work shall be subject to inspection in accordance with clauses entitled "Material and Workmanship" and "Inspection and Acceptance" of the General Provisions at any one or more of the following locations, as determined by the Contracting Officer: at the place of production or manufacture, at the shipping point, or at the site of work. To allow sufficient time to provide for inspection, the Contractor shall submit to the Contracting Officer, at the time of issuance, copies in triplicate of purchase orders, including drawings and other pertinent information, covering materials on which inspection will be made as advised by the Contracting Officer, or shall submit other evidence in the event such purchase orders are issued verbally or by letter.

9. CONTRACT ADJUSTMENTS

Where adjustments are allowed for performance wholly or substantially by subcontractors or suppliers, such adjustments may include an allowance for the prime Contractor's indirect cost and profit. However, the total of such allowances for the prime Contractor's indirect cost and profit shall not exceed 10 percent of the adjustment allowed for the subcontractor or supplier. Where more than one tier of subcontractors or suppliers are involved in the performance, the total allowance for indirect cost and profit allowed for each tier shall not exceed 10 percent of the adjustment allowed for the subcontractor or supplier who wholly or substantially performs the work.

10. BREAKDOWN OF CONTRACT PRICES

In addition to the requirements of the General Provisions clause entitled "Payments to the Contractor", the Contractor shall submit for information a detailed breakdown of the total contract price within 30 calendar days after the date of the notice to proceed. The price breakdown shall be submitted in triplicate to the Western Area Power Administration, P.O. Box 3402, Golden, CO 80401, Attention: Code A2610. The breakdown of contract costs shall be arranged by bid item with a further more detailed division into the various kinds of work which make up the bid item. Whether there are few bid items or where there is only one lump-sum bid item, contract costs shall be furnished for the various kinds of work covered in the technical paragraphs of the specifications. The

cost breakdown shall show the quantity of each type of work, the unit price and the total price therefor. The Contractor shall obtain cost information from his subcontractor as required to provide the Government with the actual breakdown of the bid price.

11. RATES OF WAGES

a. General. Pursuant to the provisions of the Davis-Bacon Act, 40 U.S.C. 276(a), as amended, the Secretary of Labor has determined that rates of wages and fringe benefits listed in this paragraph are those prevailing for the classification specified in the locality of the work covered by the specifications. Refer to the General Provisions clause entitled "Davis-Bacon Act" for additional requirements.

b. Fringe Benefits. Fringe benefit payments include contributions, except those required by Federal, State, or local law, which the Contractor makes irrevocably to a trustee or a third party pursuant to any fund, plan, or program to provide for medical or hospital care compensation for injuries or illness resulting from occupational activity, unemployment benefits, life insurance, disability and sickness insurance, accident insurance (all designated as health and welfare), pensions, vacation and holiday pay, apprenticeship, or other similar programs, and other bona fide fringe benefits.

c. Local Labor Conditions. While the wage rates and fringe benefits shown are the minimum rates required by these specifications to be paid during the life of the contract, it is the responsibility of bidders to inform themselves as to local labor conditions such as the length of workday or workweek, overtime compensation, fringe benefit contributions, labor supply, and prospective changes or adjustments of wage rates or fringe benefits. No increase in the contract price will be allowed or authorized on account of the payment of wage rates or fringe benefits in excess of those listed therein.

d. List of Wage Rates. The classification, wage rates, and fringe benefits are listed hereinafter:

12. MOBILIZATION AND PREPARATORY WORK:

a. GENERAL: For the purposes of providing for expenses incident to the initiation of construction and discouraging unbalanced bidding, an item not to exceed 5 percent of total for the schedule has been included in the schedule to provide for payment for mobilization and preparatory work. The item for payment for mobilization and preparatory work is intended to compensate the Contractor for operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of offices, buildings, plants and other facilities at the project site; for payment of premiums for bonds and insurance for the project; for any necessary costs of acquisition of equipment, including purchase and

mobilization expense; and for any other work and operations which must be performed or costs that must be incurred incident to the initiation of meaningful work at the site and for which payment is not otherwise provided for under the contract.

b. FACILITIES AND EQUIPMENT COVERED BY MOBILIZATION WORK: All facilities, plant, and equipment which are established at or brought to the worksite shall be deemed to be subject to the provisons of this paragraph unless the Contracting Officer specifically provides otherwise in writing for a particular item or items. The Contractor shall be solely responsible for the adequacy, efficiency, use, protection, maintenance, repair, and preservation of all facilities, plant, and equipment. The facilities, plant, and equipment covered by this paragraph shall not be dismantled or removed from the worksite prior to completion of the work under the contract without the written permission of the Contracting Officer.

c. TERMINATION FOR DEFAULT: All facilities, plant, and equipment on the worksite shall also be subject to Western's right to take possession of and utilize the same for the purposes of completion of the work as provided by the General Provision clause entitled "Termination for Default" should the Contractor's right to proceed be terminated thereunder. In addition, any encumbrance, lien, or other security interest on any such facilities, plant, or equipment shall be subordinated to Western's rights under the General Provision clause titled "Terminiation for Default," to utilize all facilities, plant, and equipment to complete the work under the contract, and the Contractor agrees to provide evidence of this, acceptable to the Contracting Officer.

d. PAYMENT: Payment for mobilization and preparatory work will be made at the lump-sum price bid therefore in the schedule. Progress payment for mobilization and preparatory work will be made as follows:

(1) When 5 percent of the total original contract amount is earned from other schedule items, 50 percent of the amount bid for mobilization and preparatory work will be paid.

(2) When 10 percent of the total original contract amount is earned from other schedule items, the balance of the amount bid for mobilization and preparatory work will be paid.

Progress payments for mobilization and preparatory work shall be subject to retainage as provided by the General Provisions clause entitled "Payments to Contractor." In addition, the item for mobilization and preparatory work will not be considered to be a separate division of the work, completion of which would permit the payment of the complete item price without retention.

13. PROTECTION OF REAL ESTATE CROSSED BY RIGHT-OF-WAY

a. GENERAL: The Contractor shall limit the movement of his crews and equipment to the right-of-way, including access routes. The Contractor shall further limit movement on the right-of-way, so as to minimize damage to grazing land, crops, orchards, or property and shall avoid marring the lands. The Contractor shall be responsible for all damages off the right-of-way and shall settle all such damage claims directly with the property owner. Pursuant to the General Provisions clause titled "Permits and Responsibilities," the Contractor shall be responsible for all damages as a result of his fault or negligence.

b. RESTORATION OF LAND TO ORIGINAL CONDITIONS: When weather and ground conditions permit, the Contractor shall obliterate all Contractor-caused deep ruts that are hazardous to farming operations and to movement of equipment. Such ruts shall be leveled, filled and graded, or otherwise eliminated in an approved manner. Ruts, scars and compacted soils, in hay meadows, alfalfa fields, pastures, and cultivated productive lands shall have the soil loosened and leveled by scarifying, harrowing, disking, or other approved methods.

Damage to ditches, tile drains, terraces, roads, and other features of the land shall be corrected. At the end of each construction season and before final acceptance of the work, all ruts shall be obliterated and all trails and areas that are hard-packed as a result of Contractor operations shall be loosened and leveled. The land and facilities shall be restored as nearly as practicable to their original condition before final acceptance of the work.

c. HILLSIDE EROSION PREVENTION: Water turnoff bars or small terraces shall be constructed across all right-of-way trails on hillsides to prevent water erosion and to facilitate natural revegetation on the trails.

d. IRRIGATION DITCHES, DRAINAGE DITCHES, TERRACES AND TILE DRAINS: The Contractor shall take measures, especially during the irrigation season, to insure that his operations do no affect the operation of irrigation ditches, drainage ditches, terraces, and tile drains, and to insure that any other irrigation features are protected and maintained so that they will operate as required during the irrigation season.

e. RESOLUTION OF DAMAGE CLAIMS: The Contractor shall promptly notify the property owners of any damage which is his responsibility. The Contractor, within 60 days after his knowledge of or notice from a landowner of damages off the right-of-way caused by his operations under this contract, shall notify the Contracting Officer's Technical Representative in writing as to his disposition of each such claim or his assumption of responsibility for damage. In order to adequately protect the Government against claims, demands, or liabilities arising

out of the Contractor's construction operations under this contract the Contracting Officer may withhold such sums as he may deem appropriate from progress payments due the Contractor until the matter is settled. The Contracting Officer may also withhold final payment, or any part thereof until the Contractor presents satisfactory evidence that all claims which are the responsibility of the Contractor have been settled.

14. POSTING SECURITIES IN LIEU OF RETAINED PERCENTAGES

a. At his option the Contractor may, subject to procedures prescribed by the Contracting Officer, deposit approved interest-bearing negotiable securities, with interest accruing to the Contractor, in lieu of retained percentages contemplated in clause of the General Provisions entitled "Payments to Contractor."

b. If the Contractor elects to exercise his option, he shall notify the Contracting Officer, who will then provide him with a form of agreement to which he must subscribe and which will set forth the requirements deemed necessary to protect the interest of the Government to the same extent as would be the case if the option to post securities in lieu of retained percentages were not exercised. A copy of the notification letter shall be sent by the Contractor to address shown below. The required forms of agreement are available for inspection by bidders at the office of the Contracting Officer.

c. The securities shall be deposited in escrow with an escrow agent approved by the Contracting Officer. The escrow agent shall be insured by the Federal Deposit Insurance Corporation.

Send notification letter to:

Assistant Area Manager for Construction
Huron Construction Office
P.O. Box 921
Huron, South Dakota 57350

SUPERSEDEAS DECISION

STATE: Montana COUNTIES: Statewide
DECISION NUMBER: MT81-5138 DATE: Date of Publication
Supersedes Decision No. MT81-5114 dated May 8, 1981, in 46 FR 25925
DESCRIPTION OF WORK: Heavy and Highway Projects

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
BOILERMAKERS	$14.97	$1.375	$1.15		.05
CARPENTERS:*					
Area 1:					
Carpenters	11.43	.90	1.25	.50	.06
Millwrights	12.43	.90	1.25	.50	.06
Piledrivermen	11.68	.90	1.25	.50	.06
CEMENT MASONS:					
Cement Masons	10.88	.85	.40		
Grinder, Bush Hammer and Clipping Pan preparing finished surface; Epoxy	11.03	.85	.40		
ELECTRICIANS:*					
Area 1	14.35	.70	3%+.50		1/2%
Area 2:					
Electricians	16.30	.70	3%+.75		1/2%
Cable Splicers	16.75	.70	3%+.75		1/2%
Area 3:					
Contracts under $75,000:					
Electricians	14.45	.70	3%+.75		1/2%
Cable Splicers	15.17	.70	3%+.75		1/2%
Contracts over $75,000:					
Electricians	15.90	.70	3%+.75		1/2%
Cable Splicers	16.70	.70	3%+.75		1/2%
Area 4	14.95	.70	3%+.50		1/2%
Area 5:					
Electricians	15.90	.70	3%+.75		1/2%
Cable Splicers	16.70	.70	3%+.75		1/2%
Area 6	11.47		3%		1/2%
Area 7:					
Electricians	15.65	.70	3%+.50		1/2%
Cable Splicers	16.43	.70	3%+.50		1/2%
Area 8:					
Electricians	13.70	.70	3%+.50		1/2%
Cable Splicers	15.79	.70	3%+.50		1/2%
Area 9:					
Electricians	13.40	.70	3%+.50		1/2%
Cable Splicers	14.07	.70	3%+.50		1/2%
IRONWORKERS:*					
Area 1	13.21	.90	1.45		.15
Area 2	17.11	.93	1.90		.10
Area 3	13.21	.90	1.45		.15

*See AREA Descriptions - following Page

DECISION NO. MT81-5138

AREA DESCRIPTIONS

CARPENTERS:
Area 1: Statewide excluding Beaverhead and Silver Bow Counties

ELECTRICIANS:
Area 1: Beaverhead, Deer Lodge, Granite, Jefferson, Madison, Silver Bow and Power Counties

Area 2: Big Horn, Carbon, Carter, Dawson, Golden Valley, Musselshell, Powder River, Prairie, Rosebud, Stillwater, Treasure, Wibaux, and Yellowstone Counties

Area 3: Blaine, Chouteau, Daniels, Fergus, Glacier, Hill, Judith-Basin, Liberty, McCone, Petroleum, Pondera, Phillips, Richland, Roosevelt, Sheridan, Teton, Toole, Valley, and Wheatland Counties

Area 4: Broadwater, Lewis and Clark, and Meagher Counties

Area 5: Cascade County

Area 6: Custer and Garfield Counties

Area 7: Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders Counties

Area 8: Gallatin County

Area 9: Park and Sweet Grass Counties

IRONWORKERS:
Area 1: Beaverhead County, Broadwater County, Deer Lodge County, Gallatin County, Granite County, Jefferson County, Lewis and Clark County (southern half including Wolf Creek), Madison County, Park County, Powell County, Ravalli County, and Silver Bow County

Area 2: Flathead, Glacier, Lake, Lincoln, Mineral, Missoula, and Sanders Counties

Area 3: Remaining Counties (including northern half of Lewis and Clark County)

DECISION NO. MT81-5138

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
PAINTERS:*					
Area 1:					
Brush or Roller, Prep work, Pot Tender	$12.08	.59	.50		.03
Wet Sandblasting, Brush or Roller application of cold tar, epoxies and acid resistant materials	14.08	.59	.50		.03
Spray application of cold tar, epoxies and acid resistant materials	17.08	.59	.50		.03
Paper or Vinyl Hanger	12.08	.59	.50		.03
Structural Steel: Brush or Roller	14.08	.59	.50		.03
Perfa-taping	12.58	.59	.50		.03
Structural Steel: Spraying	15.08	.59	.50		.03
Airless Spraying	13.08	.59	.50		.03
Area 2:					
Brush; Roller; Floor Layers	11.56	.78	.50		.10
Brush, Roller on steel and roofs, Pot Tender, and Paperhanger	11.81	.78	.50		.10
Perfataper (hand tools)	11.66	.78	.50		.10
Spray (not steel)	12.54	.78	.50		.10
Sandblaster, commercial and steel; Spray on structural steel and tanks	12.79	.78	.50		.10
Perfataper (machine tools)	12.06	.78	.50		.10
Area 3:					
Painter	10.02				
Paint Mitts	10.52				
Perfa-taping	10.27				

*See AREA Descriptions - Page 5

DECISION NO. MT81-5138

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
PAINTERS:* (Cont'd)					
Area 3: (Cont'd)					
Application of cold tar products, epoxies, polyurethanes and acid resistant paints; Water Sandblasting and Steam cleaning; Stacks and steeples; Brushing of steel; Spraying and airless spraying; Work over 30 ft.	$12.80				
Area 4:					
Painter, Brush, Preparatory work, Pot Tender, Roller up to 9 inches	12.42	.69	.40		10
Paperhanger, Brush on steel	12.92	.69	.40		10
Water and Sandblasting; Application of cold tar products, epoxies, polyurethanes and acid resistant paints; Spraying and airless spray	14.67	.69	.40		10
Roller over 9" long	16.02	.69	.40		10
Signwriter	12.78	.69	.40		10
Spray and Roller (in shop)	12.78	.69	.40		10
Spray and Roller (out shop)	14.18	.69	.40		10
Hand Taper	12.82	.69	.40		10
Machine Taper	14.07	.69	.40		10
Area 5:	10.90				
Area 6	13.67	.69	.50		.04
Area 7:					
Highway parking and marking traffic surface applicator Operator; Material Mixer; Sandblaster; Striper	10.60	.56	.40		
The installation of plastic, metal or composition button, or lines used instead of paint.					

*See AREA Descriptions - Page 5

DECISION NO. MT81-5138

AREA DESCRIPTIONS

PAINTERS:

Area 1: The entire Counties of Beaverhead, Gallatin, Park and Silver Bow. The Northern portion of Jefferson County from a line running East and West (5) miles south of the southern City limits of Boulder, Montana; the south part of Jefferson County from a line running due west from the south limits of Tosten, Montana; the Southern portion of Lewis & Clark County from a line running east and west through the southern limits of Craig, Montana; the Southern portion of Powell County from a line running east and west through the Southern limits of Helmsville, Montana; the west part of Madison County from a line running north and south through the west limits of Harrison, Montana

Area 2: Big Horn, Carbon, Carter, Custer, Dawson, Fallon, Golden Valley, Musselshell, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, and Treasure Counties; Wheatland County (south of the City of Harlowton); Wibaux and Yellowstone Counties

Area 3: Deer Lodge County and the southern part of Granite County from a line east-west through the southern limits of Phillipsburg

Area 4: Cascade County; Chouteau County (south of a line running east and west through the southern limits of Big Sandy); Daniels and Fergus Counties; Glacier County (including Glacier National Park); Garfield and Judith-Basin Counties; Lewis and Clark County (northern portion from a line running east and west through the northern limits of Craig), McCone, Phillips, Pondera, Petroleum, Richland, Roosevelt, Sheridan, Teton, Toole, and Valley Counties; Wheatland County (northern area from a line running east and through the southern limits of Harlowtown)

Area 5: Blaine, Hill, and Liberty Counties; Chouteau County (north of the southern limits of the City of Big Sandy)

Area 6: Flathead County; Granite County (northern area north of City limits of Phillipsburg); Lake County (southern area including the City of Ronan); Lincoln, Mineral, and Missoula Counties; Powell County (northern area through south limits of Helmsville); Ravalli and Sanders Counties

Area 7: Statewide

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	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
PLUMBERS:*					
Area 1	$15.78	.75	.70		.15
Area 2	16.20	.90	1.10		.17
Area 3	15.35	.70	.85		.10
Area 4	15.90	1.00	1.10		.20
SHEET METAL WORKERS:*					
Area 1	14.32	.73	.66		.24
Area 2	14.71	.73	.50		.24
Area 3	14.25	1.205	.805		.24
Area 4	14.04	.73	.75		.24
Area 5	14.09	.73	.73		.24

AREA DESCRIPTIONS

PLUMBERS:

Area 1: Flathead, Lake, Lincoln, Mineral, Missoula, and Sanders Counties

Area 2: Blaine, Cascade, Chouteau, Fergus, Glacier, Hill, Judith-Basin, Liberty, McCone, Meagher, Phillips, Pondera, Roosevelt, Teton, Toole, and Valley Counties

Area 3: Beaverhead, Broadwater, Deer Lodge, Gallatin, Granite, Jefferson, Lewis and Clark, Madison, Park, Powell, Silver Bow and Sweet Grass Counties

Area 4: Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, Golden Valley, Musselshell, Petroleum, Powder River, Prairie, Richland, Rosebud, Sheridan, Stillwater, Treasure, Wheatland, Wibaux and Yellowstone Counties

SHEET METAL WORKERS:

Area 1: Broadwater County, Jefferson County (including the north half of the City of Boulder), Lewis and Clark County, and Meagher County

Area 2: Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders Counties

Area 3: Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Fergus, Gallatin, Garfield, Golden Valley, McCone, Musselshell, Petroleum, Phillips, Powder River, Park, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Sweet Grass, Valley, Wheatland, Wibaux, Treasure, and Yellowstone Counties

Area 4: Blaine, Cascade, Chouteau, Glacier, Hill, Judith-Basin, Liberty, Pondera, Teton, and Toole Counties

Area 5: Beaverhead County, Deer Lodge County, Granite County, Jefferson County (southern half), Madison County, Powell County, and Silver Bow Counties

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LABORERS	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Group 1	$10.50	.75	.65	.30	.05
Group 2	10.66	.75	.65	.30	.05
Group 3	10.80	.75	.65	.30	.05
Group 4	11.50	.75	.65	.30	.05

Group 1: Axeman; Carpenter Tender; Car and Truck Loaders, Scissorman; Chuck Tender and Nipper (above ground); Cosmolene applying and removing; Dumpman (Spotter); Fence Erector and Installer (includes the installation and erection of fences, guard rails, median rails, reference posts, right-of-way markers and guide posts); Form Stripper; General Laborer - Heavy Highway, Highway Bridge and Structure, Crusher and Batch Plant Laborers; Heater Tender (not covered by joint board decision - such as radiant type of butane five, without blowers or fans - General Laborers scale); Landcape Laborer; Riprap Tender; Stake Jumper for Equipment; Sandblaster Tail Hoseman, Pot Tender; Sod Cutter, hand operated (General Laborers); Tool Checker; Tool Houseman

Group 2: Burning Bar; Cement Mason Tender; Caisson Workers (free air); Cement Handlers; Choker Setter; Concrete Laborers (wet or dry); Bucketmen and Signalmen; Curb Machine; Dumpman (Grade Man); Form Setter; Hand Faller; Jackhammer, Pavement Breaker, Wagon Driller, Concrete Vibrator, Mechanical Tamper Vibrating Roller, hand steered and other power tools; Nozzleman - air water, Gunite and Placo Machine; Concrete or Asphalt Saws; Pipelayer (all types); Laser equipment Operator; Pipewrapper; Posthole Digger (power auger); Power Saw (bucking); Powderman Tender; Power driven wheelbarrow; Rigger; Riprapper; Spiker Driver, single or dual or hand; Switchman; Tar Pot Operator

Group 3: Asphalt Raker; Concrete Vibrator (5" and over); Drills, Air Track, self-propelled, Cat and Truck mounted air operated Drills; Drills, Air Track with dual masts; Drills, Air Tract, self-propelled Mustang type and similar; Equipment Handler; High Scaler; High Pressure Machine Nozzleman; Power Saw (falling); Sandblaster

Group 4: Core Drill Operator; Grade Setter; Powderman; Cutting torch and air arc Operator

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POWER EQUIPMENT OPERATORS: STATEWIDE	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
A-Frame Truck Crane, Winch Truck and similar	$12.80	.97	.85	.50	.10
Air Compressor, single	12.49	.97	.85	.50	.10
Air compressor, two or more	12.66	.97	.85	.50	.10
Air Doctor	12.96	.97	.85	.50	.10
Asphalt Paving Machine Operator	12.96	.97	.85	.50	.10
Asphalt Paving Machine Screed Operator	12.96	.97	.85	.50	.10
Automatic Finegrader, Gurries and other similar types	13.09	.97	.85	.50	.10
Belt Finish Machine Operator	12.66	.97	.85	.50	.10
Bit Grinder	12.96	.97	.85	.50	.10
Bituminous Mixer Paving, Travel Plant	12.96	.97	.85	.50	.10
Boring Machine (small), Jeep, Pickup or Farm Tractor mounted	12.55	.97	.85	.50	.10
Boring Machine (large)	12.96	.97	.85	.50	.10
Broom, self-propelled	12.63	.97	.85	.50	.10
Cableway Highline Operator	13.47	.97	.85	.50	.10
Cement Silo Operator	12.75	.97	.85	.50	.10
Central Mixing Plants, Concrete dam and stationary	13.21	.97	.85	.50	.10
Chain Bucket Loader	12.68	.97	.85	.50	.10
Chip or Gravel Spreader, self-propelled	12.68	.97	.85	.50	.10
Concrete Batch Plant, one and two Mixers	12.96	.97	.85	.50	.10
Concrete Batch Plant, three and four Mixers	13.16	.97	.85	.50	.10
Concrete Batch Plant, five Mixers and over	13.36	.97	.85	.50	.10
Concrete Batch Plant Oiler, up to and including two Mixers	12.48	.97	.85	.50	.10
Concrete Batch Plant Oiler, three Mixers and over	12.79	.97	.85	.50	.10
Concrete Bucket Dispatcher	12.96	.97	.85	.50	.10
Concrete Curing Machine	12.96	.97	.85	.50	.10

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POWER EQUIPMENT OPERATORS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Concrete Finish Machine Paving	$12.96	.97	.85	.50	.10
Concrete Float-Spreader	12.96	.97	.85	.50	.10
Concrete Mixer, three bags and under	12.55	.97	.85	.50	.10
Concrete Mixer, four bags and over	12.72	.97	.85	.50	.10
Concrete Power Saw, self-propelled	12.96	.97	.85	.50	.10
Concrete Travel Batcher	12.96	.97	.85	.50	.10
Concrete Conveyor under 40 feet	12.54	.97	.85	.50	.10
Concrete Conveyor over 40 feet	13.29	.97	.85	.50	.10
Concrete Pump	13.29	.97	.85	.50	.10
Conveyor Loader Operator, up to and including 42' belt	12.54	.97	.85	.50	.10
Conveyor Loader Operator over 42' belt	12.66	.97	.85	.50	.10
Crane, to and including 80' boom	13.12	.97	.85	.50	.10
Crane, 81' to 130' boom	13.27	.97	.85	.50	.10
Crane, 131' to 150' boom	13.32	.97	.85	.50	.10
Crane, 151' boom and over	13.37	.97	.85	.50	.10
Crane Oiler	12.53	.97	.85	.50	.10
Crane with jibs an additional $.15 per hour					
Crusher Operator	12.96	.97	.85	.50	.10
Crusher Oiler	12.45	.97	.85	.50	.10
Crusher Conveyor, when required	12.42	.97	.85	.50	.10
Distributor Operator	12.96	.97	.85	.50	.10
DW 10, 15, or 20 tractor pulling Roller	12.68	.97	.85	.50	.10
Electric Overhead Cranes	13.14	.97	.85	.50	.10
Elevating Grader	12.96	.97	.85	.50	.10
Farm type tractor up to and including 50 HP engine	12.42	.97	.85	.50	.10

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POWER EQUIPMENT OPERATORS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Farm Type tractor, over 50 HP engine	$12.50	.97	.85	.50	.10
Field Equipment Servicemen	12.88	.97	.85	.50	.10
Fireman	12.55	.97	.85	.50	.10
Forklift, on construction job site	12.77	.97	.85	.50	.10
Form Grader Operator	12.73	.97	.85	.50	.10
Gradall Operator	12.96	.97	.85	.50	.10
Grade Setter	12.42	.97	.85	.50	.10
Heavy Duty Drills, all types	12.96	.97	.85	.50	.10
Herman-Nelson Heaters and similar type	12.50	.97	.85	.50	.10
Hoist Operator, single drum	12.73	.97	.85	.50	.10
Hoist, two or more drums	12.96	.97	.85	.50	.10
Helicopter Hoist Operator	13.46	.97	.85	.50	.10
Hot Plant Operator	12.96	.97	.85	.50	.10
Hot Plant Fireman, when in operation	12.96	.97	.85	.50	.10
Hot Plant Oiler, 100 ton per hour or over	12.45	.97	.85	.50	.10
Hydra Lift and similar types	12.86	.97	.85	.50	.10
Industrial Locomotive all classes	12.96	.97	.85	.50	.10
Mechanic and/or Welder on job	13.06	.97	.85	.50	.10
Mechanic Shop (Dec. April 1)	12.66	.97	.85	.50	.10
Mixermobile	13.04	.97	.85	.50	.10
Motor Patrol Operator	13.09	.97	.85	.50	.10
Mountain Logger or similar type	12.96	.97	.85	.50	.10
Mucking Machine Operator	12.96	.97	.85	.50	.10
Oiler-Driver, Rubber tired Cranes	12.53	.97	.85	.50	.10
Oilers, other than Shovels and Cranes	12.45	.97	.85	.50	.10
Oiler, Hoist House, dams	12.86	.97	.85	.50	.10
Pavement Breakers, Emsco and similar	12.96	.97	.85	.50	.10
Paving and Mixing Machine	13.09	.97	.85	.50	.10

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POWER EQUIPMENT OPERATORS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and or Appr. Tr.
Power Auger, large truck or tractor mounted and Punch	$12.96	.97	.85	.50	.10
Power Mixer, single or double drum	12.96	.97	.85	.50	.10
Power Saw, multiple cut, self-propelled	12.96	.97	.85	.50	.10
Pumpcrete or Grout Machine	12.96	.97	.85	.50	.10
Pumpman	12.49	.97	.85	.50	.10
Push Tractor	12.97	.97	.85	.50	.10
Quad Cat	13.26	.97	.85	.50	.10
Quad Loader and similar type	13.54	.97	.85	.50	.10
Radiator Repairman	12.77	.97	.85	.50	.10
Raygo Gaint	13.54	.97	.85	.50	.10
Refrigeration Plant Operator	12.96	.97	.85	.50	.10
Retort Operator	12.55	.97	.85	.50	.10
Roller, on blade or hot mix oil paving	12.96	.97	.85	.50	.10
Roller, on other blade or hot mix paving	12.66	.97	.85	.50	.10
Roller, 25 ton or over	12.96	.97	.85	.50	.10
Ross and similar type Carriers, on construction site	12.96	.97	.85	.50	.10
Rubber-tired Dozer	12.96	.97	.85	.50	.10
Rubber-tired Front End Loader, 1 cu. yd, and under	12.67	.97	.85	.50	.10
Rubber-tired Front End Loader, 1 cu. yd. to and including 3 cu. yds.	12.96	.97	.85	.50	.10
Rubber-tired Front End Loader, over 3 cu. yds. to and including 5 cu. yds.	13.08	.97	.85	.50	.10
Rubber-tired Front End Loader, over 5 cu. yds. to and including 10 cu. yds.	13.18	.97	.85	.50	.10

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POWER EQUIPMENT OPERATORS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and or Appr. Tr.
Rubber-tired Front End Loader, over 10 yards to and including 15 yards	$13.28	.97	.85	.50	.10
Rubber-tired Front End Loader, over 15 yards	13.38	.97	.85	.50	.10
Scraper, DW 15, 20, 21 and similar type if power unit is not used	12.96	.97	.85	.50	.10
Scraper, single or twin engine pulling Belly Dump Trailer	13.34	.97	.85	.50	.10
Scraper, single engine	13.09	.97	.85	.50	.10
Scraper, twin engine	13.19	.97	.85	.50	.10
Scraper, tandem engine or 3 engine	13.45	.97	.85	.50	.10
Self-propelled Sheepfoot and similar type	12.96	.97	.85	.50	.10
Shovels, including all attachments, under 1 cu. yd.	12.96	.97	.85	.50	.10
Shovels, including all attachments, 1 cu. yd. to and including 3 cu. yds.	13.14	.97	.85	.50	.10
Shovels, including all attachments, over 3 cu. yds. to and including 5 cu. yds.	13.41	.97	.85	.50	.10
Shovels, including all attachments over 5 cu. yds.	13.54	.97	.85	.50	.10
Shovel Oiler, 3 CU. Yds.and under	12.45	.97	.85	.50	.10
Shovel Oiler, over 3 cu. yds.	12.86	.97	.85	.50	.10
Slip Form Paver Operator	13.09	.97	.85	.50	.10
Stiff Leg Derrick and Guy Derrick	13.41	.97	.85	.50	.10
Track-type Front End Loaders, up to and including 5 cu. yds.	12.96	.97	.85	.50	.10

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POWER EQUIPMENT OPERATORS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Track-type Front End Loaders, over 5 cu. yds. to and including 10 cu. yds.	$13.19	.97	.85	.50	.10
Track-type Front End Loaders, over 10 cu. yds. to and including 15 cu. yds.	13.29	.97	.85	.50	.10
Track-type Front End Loaders, over 15 cu. yds.	13.39	.97	.85	.50	.10
Track-type Tractor w/wo attachments	12.96	.97	.85	.50	.10
Track-type Tractor, on Euclid Loader	13.14	.97	.85	.50	.10
Trenching Machine	12.96	.97	.85	.50	.10
Turnhead Conveyor, or Head Tower on Batch Plant	12.96	.97	.85	.50	.10
Wagner Roller and similar type	12.96	.97	.85	.50	.10
Whirley Crane Operator	13.49	.97	.85	.50	.10
Whirley Crane Oiler	12.86	.97	.85	.50	.10
Water Pull when used for compaction	12.96	.97	.85	.50	.10
Washing and Screening Plant Operator	12.96	.97	.85	.50	.10
Washing and Screening Plant Oiler	12.45	.97	.85	.50	.10
Yo-Yo Cat, both ends	13.16	.97	.85	.50	.10

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TRUCK DRIVERS STATEWIDE	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
COMBINATION TRUCK; Concrete Mixer and Transit Mixer:					
To & including 4 cu. yds.	$11.10	.82	.84		
Over 4 cu. yds. to and including 6 cu. yds.	11.18	.82	.84		
Over 6 cu .yds. to and including 8 cu. yds.	11.26	.82	.84		
Over 8 cu. yds. to and including 10 cu. yds.	11.34	.82	.84		
Over 10 cu. yds.-additional $.08 per hour each additional 2 cu. yds. increment					
DISTRIBUTOR DRIVER	11.08	.82	.84		
DRY BATCH TRUCKS:					
3 Batch or under	10.85	.82	.84		
Over 3 Batch to and including 5 Batch	11.98	.82	.84		
Over 5 Batch to and including 10 Batch	11.14	.82	.84		
Over 10 Batch to and including 15 Batch	11.30	.82	.84		
Over 15 Batch-additional $.15 per hour each additional 5 Batch increment					
PICKUP DRIVER, HAULING MATERIALS	10.95	.82	.84		
DUMPMAN, GRAVEL SPREADER BOX OPERATOR; Pilot Car Driver, Teamsters	10.85	.82	.84		

DECISION NO. MT81-5138

TRUCK DRIVERS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and or Appr. Tr.
DUMP TRUCKS And SIMILAR EQUIPMENT, DW 20, DW 21, or EUCLID TRACTORS, Pulling P.R. 21 or similar Dump Wagons:					
Water Level Capacity, including Sideboards:					
7 cu. yds. or less	$10.85	.82	.84		
Over 7 cu. yds. to and including 10 cu. yds.	10.98	.82	.84		
Over 10 cu. yds. to and including 15 cu. yds.	11.14	.82	.84		
Over 15 cu. yds. to and including 20 cu. yds.	11.28	.82	.84		
Over 20 cu. yds. to and including 25 cu. yds.	11.34	.82	.84		
Over 25 cu. yds. to and including 30 cu. yds.	11.40	.82	.84		
Over 30 cu. yds. to and including 35 cu. yds.	11.46	.82	.84		
over 35 cu. yds. to and including 40 cu. yds.	11.52	.82	.84		
Over 40 cu. yds. to and including 45 cu. yds.	11.58	.82	.84		
Over 45 cu. yds.-additional $.10 per hour each additional 5 cu. yds. increment					
DUMPSTERS	10.98	.82	.84		
POWER TRUCK DRIVER (bulk unloader type)	11.03	.82	.84		
FLAT TRUCKS:					
To and including 3 tons	11.00	.82	.84		
Over 3 tons factory rating	11.20	.82	.84		

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TRUCK DRIVERS: (Cont'd)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
FUEL TRUCK DRIVERS; TIREMEN	$11.44	.82	.84		
LOWBOYS, FOUR-WHEEL TRAILER, FLOAT SEMI-TRAILER	11.20	.82	.84		
LUMBER CARRIERS, LIFT TRUCK and FORK LIFTS	11.20	.82	.84		
POWER BROOM	10.94	.82	.84		
WATER TANK DRIVERS, PETROLEUM PRODUCTS DRIVERS:					
2,500 gallons and under	10.85	.82	.84		
Over 2,500 gallons to and including 4,500 gallons	11.14	.82	.84		
Over 4,500 gallons to and including 6,000 gallons	11.34	.82	.84		
Over 6,000 gallons to and including 8,000 gallons	11.40	.82	.84		
Over 8,000 gallons to and including 10,000 gallons	11.48	.82	.84		
Over 10,000 gallons - additinal $.10 per hour each additinal 2,000 gallons increment					
TRUCK MECHANIC	11.84	.82	.84		

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	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
LINE CONSTRUCTION:					
Flathead, Lake, and Lincoln Counties:					
All work for power utilities, all highway lighting, street lighting and motor traffic controlling.					
Lineman	$13.92	.45	3%+.50		1/2%
Cable Splicers	15.49	.45	3%+.50		1/2%
Pole Sprayer	12.37	.45	3%+.50		1/2%
Line Equipment Operators	11.87	.45	3%+.50		1/2%
Powderman, Jackhammer, Compressorman	10.29	.45	3%+.50		1/2%
Groundman "A"	9.65	.45	3%+.50		1/2%
Tree Trimmer	12.83	.45	3%+.50		12/%
Head Groundman and Groundman "B" are not applicable					
Statewide, except Flathead, Lake, and Lincoln Counties:					
Lineman, Pole Sprayer	12.90	.45	3%+.50		1/4%
Cable Splicers	13.80	.45	3%+.50		1/4%
Line Equipment Operators' Powderman	11.40	.45	3%+.50		1/4%
Groundman	9.23	.45	3%+.50		1/4%

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	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
DREDGING: STATEWIDE					
Assistant Mate (Deckhand)	$15.02	$1.07	$ 1.50		.14
Fireman	15.12	1.07	1.50		.14
Oiler	15.12	1.07	1.50		.14
Assistant Engineer (electric, diesel, steam or booster Pump)	15.46	1.07	1.50		.14
Mates and Boatman	15.46	1.07	1.50		.14
Engineer Welder	15.51	1.07	1.50		.14
Craneman	15.51	1.07	1.50		.14
Assistant Engineer (electric, generator Operator for Primary Pump, power barge or dredge)	15.56	1.07	1.50		.14
Leverman, Dipper:					
(a) 5 yards and under	16.27	1.07	1.50		.14
(b) over 5 yards	16.82	1.07	1.50		.14
Leverman, Hydraulic	15.88	1.07	1.50		.14

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5 (a)(1)(ii)).

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DECISION NO. MT81-5138 - Mod. #1
(46 FR 40439 - August 7, 1981)
Statewide, Montana

Change:	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Carpenters:					
Area 1:					
Carpenters	$11.93	.90	$1.25		.06
Millwrights	12.93	.90	1.25		.06
Piledrivermen	12.18	.90	1.25		.06
Ironworkers:					
Area 1	14.15	1.05	1.60		.15
Area 3	14.41	1.05	1.60		.15
Line Construction:					
Statewide, except Flathead, Lake and Lincoln Counties:					
Linemen, Pole Sprayer	14.71	.45	3%+.50		1/2%
Cable Splicers	15.73	.45	3%+.50		1/2%
Line Equipment Operator; Powderman	13.00	.45	3%+.50		1/2%
Groundman	10.52	.45	3%+.50		1/2%
Painters:					
Area 6	12.67	.84	.50		.04
Sheet Metal Workers:					
Area 1	15.47	.83	.66		.24
Area 2	15.38	.83	.98		.24
Area 3	15.19	1.04	.98		.24
Area 4	15.19	.83	.75		.24
Area 5	14.99	.83	.98		.24

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DECISION NO. MT81-5138 - Mod. #2
(46 FR 40439 - August 7, 1981)
Statewide, Montana

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Change:					
Electricians:					
Area 1	$15.75	.70	3%+.50		.08
Ironworkers:					
Area 1	14.41	1.05	1.60		.15
Area 2	16.74	1.00	2.15		.15
Plumbers:					
Area 3	16.45	.85	1.00		.10

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DECISION NO. MT81-5138 - Mod. #3
(46 FR 40439 - August 7, 1981)
Statewide, Montana

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Change:					
Electricians:					
Area 7:					
Electricians	$17.61	.70	3%+.50		1/2%
Cable Splicers	18.49	.70	3%+.50		1/2%
Area 8:					
Electricians	14.05	.70	3%+.50		1/2%
Cable Splicers	14.75	.70	3%+.50		1/2%
Area 9:					
Electricians	13.85	.70	3%+.50		1/2%
Cable Splicers	14.54	.70	3%+.50		1/2%
Plumbers:					
Area 4	17.60	1.00	1.10		.20
Omit:					
Cement Masons:					
Cement Masons Grinder, Bush Hammer and Chipping Fan preparing finished surface; Epoxy	10.88	.85	.40		
	11.03	.85	.40		
Add:					
Cement Masons:					
Cement Masons Grinder, Bush Hammer and Chipping Fan preparing finished surface	11.83	.85	.55		
	11.98	.85	.55		
Epoxy	12.13	.85	.55		

DECISION NO. MT81-5138 - Mod. #4 (46 FR 40439 - August 7, 1981) Statewide, Montana					
Change:					
Electricians:					
Area 4	$16.70	.70	3%+.50		1/2%
Line Construction:					
Flathead, Lake and Lincoln Counties:					
All work for power utiltites, all highway lighting, street lighting and motor traffic controlling:					
Lineman	15.59	.45	3%+.50		1/2%
Cable Splicers	17.35	.45	3%+.50		1/2%
Pole Sprayer	13.85	.45	3%+.50		1/2%
Line Equipment Operators	13.29	.45	3%+.50		1/2%
Powderman, Jackhammer, Compressorman	11.52	.45	3%+.50		1/2%
Groundman "A"	10.81	.45	3%+.50		1/2%
Tree Trimmer	14.37	.45	3%+.50		1/2%
Truck Drivers:					
Statewide - attached					

Modification Page 3

DECISION NO. MT81-5138 (Cont'd)

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
COMBINATION TRUCK; Concrete Mixer and Transit Mixer:					
To & including 4 cu. yds.	$11.85	$1.23	.84		
Over 4 cu. yds. to and including 6 cu. yds.	11.93	1.23	.84		
Over 6 cu .yds. to and including 8 cu. yds.	12.01	1.23	.84		
Over 8 cu. yds. to and including 10 cu. yds.	12.09	1.23	.84		
Over 10 cu. yds.-additional $.08 per hour each additional 2 cu. yds. increment					
DISTRIBUTOR DRIVER	11.53	1.23	.84		
DRY BATCH TRUCKS:					
3 Batch or under	11.60	1.23	.84		
Over 3 Batch to and including 5 Batch	11.73	1.23	.84		
Over 5 Batch to and including 10 Batch	11.89	1.23	.84		
Over 10 Batch to and including 15 Batch	12.05	1.23	.84		
Over 15 Batch-additional $.15 per hour each additional 5 Batch increment					
PICKUP DRIVER, HAULING MATERIALS	11.70	1.23	.84		
DUMPMAN, GRAVEL SPREADER BOX OPERATOR; Pilot Car Driver, Teamsters	11.60	1.23	.84		

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DECISION NO. MT81-5138 (Cont'd)

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
DUMP TRUCKS And SIMILAR EQUIPMENT, DW 20, DW 21, or EUCLID TRACTORS, Pulling P.R. 21 or similar Dump Wagons:					
Water Level Capacity, including Sideboards:					
7 cu. yds. or less	$11.60	$1.23	.84		
Over 7 cu. yds. to and including 10 cu. yds.	11.73	1.23	.84		
Over 10 cu. yds. to and including 15 cu. yds.	11.89	1.23	.84		
Over 15 cu. yds. to and including 20 cu. yds.	12.03	1.23	.84		
Over 20 cu. yds. to and including 25 cu. yds.	12.09	1.23	.84		
Over 25 cu. yds. to and including 30 cu. yds.	12.15	1.23	.84		
Over 30 cu. yds. to and including 35 cu. yds.	12.21	1.23	.84		
over 35 cu. yds. to and including 40 cu. yds.	12.27	1.23	.84		
Over 40 cu. yds. to and including 45 cu. yds.	12.33	1.23	.84		
Over 45 cu. yds.-additional $.10 per hour each additional 5 cu. yds. increment					
DUMPSTERS	11.73	1.23	.84		
POWER TRUCK DRIVER (bulk unloader type)	11.78	1.23	.84		
FLAT TRUCKS:					
To and including 3 tons	11.75	1.23	.84		
Over 3 tons factory rating	11.95	1.23	.84		

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DECISION NO. MT81-5138 (Cont'd)

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
FUEL TRUCK DRIVERS; TIREMEN	$12.19	$1.23	.84		
LOWBOYS, FOUR-WHEEL TRAILER, FLOAT SEMI-TRAILER	11.95	1.23	.84		
LUMBER CARRIERS, LIFT TRUCK and FORK LIFTS	11.85	1.23	.84		
POWER BROOM	11.69	1.23	.84		
WATER TANK DRIVERS, PETROLEUM PRODUCTS DRIVERS:					
2,500 gallons and under	11.60	1.23	.84		
Over 2,500 gallons to and including 4,500 gallons	11.89	1.23	.84		
Over 4,500 gallons to and including 6,000 gallons	12.09	1.23	.84		
Over 6,000 gallons to and including 8,000 gallons	12.15	1.23	.84		
Over 8,000 gallons to and including 10,000 gallons	12.23	1.23	.84		
Over 10,000 gallons - additional $.10 per hour each additional 2,000 gallons increment					
TRUCK MECHANIC	12.59	1.23	.84		

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DECISION NO. MT81-5138 - MOD. 05
(46 FR 40439 - August 7, 1981)
STATEWIDE, MONTANA

CHANGE:

	Basic Hourly Rates	Fringe Benefits
LABORERS		
Group 1	10.60	2.20
Group 2	19.71	2.20
Group 3	10.85	2.20
Group 4	11.55	2.20
POWER EQUIPMENT OPERATORS:		
A-Frame Truck Crane, Winch Truck and aimilar	12.85	2.44
Air Compressor, aingle	12.54	2.44
Air compressor, two or more	12.71	2.44
Air Doctor	13.01	2.44
Asphalt Paving Machine Operator	13.21	2.44
Asphalt Paving Machine Screed Operator	13.21	2.44
Automatic Finagrader, Gurriea and other aimila aimilar typea	13.34	2.44
Belt Finiah Machine Operator	12.71	2.44
Bite Grinder	13.01	2.44
Bituminoua Mixer Paving, Travel Plant	13.01	2.44
Boring Machine (small), Jeep, Pickup or Farm Tractor mountad	12.60	2.44
Boring Machine (large)	13.21	2.44
Broom, self-propelled	12.68	2.44
Cableway Highline Operator	13.72	2.44
Cement Silo Operator	12.80	2.44
Central Mixing Planta, Concrete dam and atationary	13.46	2.44
Chain Buckat Loader	12.73	2.44
Chip or Gravel Spreader, aelf-propelled	12.83	2.44
Concrete Batch Plant, one and two Mixara	13.21	2.44
Concrate Batch Plant, three and four Mixera	13.41	2.44
Concrete Batch Plant, five Mixara and over	13.61	2.44
Concrate Batch Plant, Oilar, up to and including two Mixers	12.53	2.44
Concrete Batch Plant Oiler, three Mixers and over	12.84	2.44
Concrete Bucket Dispatcher	13.01	2.44
Concrete Curing Machina	13.01	2.44
Concrete Finiah Machine Paving	13.21	2.44
Concrete Float-Spreader	13.11	2.44
Concrete Mixar, three bags and under	12.60	2.44
Concrete Mixer, four bags and over	12.77	2.44
Concrete Power Saw, self-propelled	13.01	2.44
Concrete Travel Batcher	13.01	2.44
Concrete Conveyor under 40 feet	12.59	2.44
Concrete Conveyor over 40 feet	13.34	2.44
Concrete Pump	13.54	2.44
Conveyor Loader Operator, up to and including 42' belt	12.59	2.44
Conveyor Loader Operator over 42" belt	12.71	2.44
Crane, to and including 80' boom	13.37	2.44
Crane, 81' to 130' boom	13.52	2.44
Crane, 131' to 150' boom	13.57	2.44
Crane, 151' boom and over	13.62	2.44
Crane Oiler	12.58	2.44
Crane with jibs and additional $.15 per hour		
Crusher Operator	13.21	2.44
Crusher Oiler	12.50	2.44
Crusher Conveyor, when required	12.47	2.44
Distributor Operator	13.11	2.44
DW 10, 15, or 20 tractor pulling Roller	12.68	2.44
Electric Overhead Cranes	13.29	2.44
Elevating Grader	13.01	2.44
Farm type tractor up to and including 50 HP engine	12.47	2.44
Farm Type tractor, over 50 HP engine	12.55	2.44
Field Equipment Serviceman	13.13	2.44
Fireman	12.60	2.44
Forklift, on construction job aite	12.82	2.44

Modification Page 11

DECISION NO. MT81-9138 - (Cont'd)	Basic Hourly Rates	Fringe Benefits
Form Grader Operator	$12.78	$2.44
Gradall Operator	13.21	2.44
Grade Setter	12.47	2.44
Heavy Duty Drills, all types	13.11	2.44
Herman-Nelson Heaters and similar types	12.55	2.44
Hoist Operator, single drum	12.78	2.44
Hoist, two or more drums	13.01	2.44
Helicopter Hoist Operator	13.51	2.44
Hot Plant Operator	13.21	2.44
Hot Plant Fireman, when in operation	13.11	2.44
Hot Plant Oiler, 100 ton per hour or over	12.50	2.44
Hydra Lift and similar types	12.91	2.44
Industrial Locomotive all classes	13.21	2.44
Mechanic and/or Welder on job	13.31	2.44
Mechanic Shop (Dec. 1 to April 1)	12.91	2.44
Mixermobile	13.09	2.44
Motor Patrol Operator	13.34	2.44
Mountain Logger or similar type	13.01	2.44
Mucking Machine Operator	13.21	2.44
Oiler-driver, Rubber tired cranes	12.58	2.44
Oilers, other than Shovels and Cranes	12.80	2.44
Oiler, Hoist House, dams	12.91	2.44
Pavement Breakers, Essco and similar	13.01	2.44
Paving and Mixing Machine	13.34	2.44
Power Auger, large turck or tractor mounted end Punch	13.21	2.44
Power Mixer, single or double drum	13.01	2.44
Power Saw, mutliple cut, self-propelled	13.01	2.44
Pumocrete or Grout Machine	13.21	2.44
Pumpman	12.54	2.44
Push Tractor	13.21	2.44
Quad Cat	13.51	2.44
Quad Loader and similar type	13.79	2.44
Radiator Repairman	$12.82	$2.44
Raygo Gaint	13.79	2.44
Refrigeration Plant Operator	13.01	2.44
Retort Operator	12.60	2.44
Roller, on blade or hot mix oil paving	13.11	2.44
Roller, on other than hot mix paving	12.71	2.44
Roller, 25 ton or over	13.01	2.44
Roms and similar type Carriers, on construction site	13.11	2.44
Rubber-tired Dozer	13.21	2.44
Rubber-tired Front End Loader, 1 cu. yd. and under	12.92	2.44
Rubber-tired Front End Loader, over 1 cu. yd. to and including 3 cu. yds	13.21	13.2 2.44
Rubber-tired Front End Loader, over 3 cu. yds. to and including 5 cu. yds.	13.33	2.44
Rubber-tired Front End Loader, over 5 cu. yds. to and including 10 cu. yds.	13.43	2.44
Rubber-tired Front End Loader, over 10 yards to and including 15 yds.	13.53	2.44
Rubber-tired Front End Loader, over 15 yards	13.63	2.44
Scraper, DW 15, 20, 21 and similar type if power unit is not used	13.11	2.44
Scraper, single or twin engine pulling Belly Dump Trailer	13.59	2.44
Scraper, twin engine	13.44	2.44
Scraper, tandem engine or 3 engine	13.70	2.44
Self-propelled Sheepfoot and similar type	13.11	2.44
Shovels, including all attachments, under 1 cu. yd.	13.21	2.44
Shovels, including all attachments, 1 cu. yd. to and including 3 cu. yds.	13.39	2.44

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DECISION NO. CA82-5138 - (Cont'd)	Basic Hourly Rates	Fringe Benefits
Over 7 cu. yds. to and including 10 cu. yds.	$12.58	$2.51
Over 10 cu. yds. to and including 15 cu. yds.	12.74	2.51
Over 15 cu. yds. to and including 20 cu. yds.	12.88	2.51
Over 20 cu. yds. and including 25 cu. yds.	12.94	2.51
Over 25 cu. yds. to and including 30 cu. yds.	13.00	2.51
Over 30 cu. yds. to and including 35 cu. yds.	13.06	2.51
Over 35 cu. yds. to and including 40 cu. yds.	13.12	2.51
Over 40 cu. yds. to and including 45 cu. yds.	13.18	2.51
Over 45 cu. yds. additional $.10 per hour each additional 5 cu. yds. increment		
Dumpsters	12.58	2.81
Power Truck Driver (bulk unloader type)	12.63	2.51
Flat Trucks:		
to and including 3 tons	12.60	2.51
Over 3 tone factory rating	12.80	2.51
Fuel Truck Drivers:		
Tiremen	13.04	2.51
Lowboys, Four-wheel trailer, Float semi-trailer	12.80	2.51
Lumber Carriers, Lift Truck and Fork Lifts	12.70	2.51
Power Broom	12.54	2.51
Water Tank Drivers, Petroleum Porducts Drivers:		
2,500 gallons and under	12.45	2.51
Over 2,500 gallons to and including 4,500 gallons	12.74	2.51
Over 4,500 gallons to and including 6,000 gallons	12.94	2.51
Over 6,000 gallons to and including 8,000 gallons	13.00	2.51
Over 8,000 gallons to and including 10,000 gallons	$13.08	$2.51
Over 10,000 gallons - additional $.10 per hour each additional 2,000 gallons increment		
Truck Mechanic	13.44	2.51
Line Construction:		
Flathead, Lake and Lincoln Counties:		
All work for power utilities, all highway lighting, street lighting and motor traffic controlling.		
Lineman	17.15	3%+.95
Cable Splicers	19.09	3%+.95
Pole Sprayer	15.24	3%+.95
Line Equipment Operators	14.62	3%+.95
Powderman	12.67	3%+.95
Jackhammer, Compressorman	11.89	3%+.95
Groundman "A"	10.81	3%+.95
Tree Trimmer	15.81	3%+.95

Modification Page 13

DECISION NO. MT81-5138 - (Cont'd)	Basic Hourly Rates	Fringe Benefits
Shovels, including all attachments, over 3 cu. yds. to and including 5 cu. yds.	$13.66	$2.44
Shovels, including all attachments over 5 cu. yds.	13.79	2.44
Shoval Oiler, 3 yds. and under	12.50	2.44
Shovel Oiler, over 3 cu. yds.	12.91	2.44
Slip Form Paver Operator	13.34	2.44
Stiff Leg Derrick and Guy Derrick	13.66	2.44
Track-type Front End Loaders, up to and including 5 cu. yds.	13.21	2.44
Track-type Front End Loaders, over 5 cu. yds. to and including 10 cu. yds.	13.44	2.44
Track-type Front End Loaders, over 10 cu. yds. to and including 15 cu. yds.	13.54	2.44
Track-type Front End Loaders, over 15 cu. yds.	13.64	2.44
Track-type Tractor w/wo attachments	13.21	2.44
Track-type Tractor, on Euclid Loader	13.39	2.44
Tranching Machine	13.21	2.44
Turnhead Convayor, or Headd Towar on Batch Plant	13.01	2.44
Wagner Roller and similar type	13.21	2.44
Whirley Crane Operator	13.74	2.44
Whirley Crane Oiler	12.91	2.44
Water Pull when used for compaction	13.01	2.44
Washing and Screening Plant Operator	13.21	2.44
Washington and Screening Plant Oiler	12.50	2.44
Yo-Yo Cat, both anda	13.41	2.44
Truck Drivers Statewide		
Combination Truck; Concrete Mixer and Transit Mixar:		
To and including 4 cu. yds.	$12.70	$2.51
Over 4 cu. yds. to and including 6 cu. yds.	12.78	2.51
Over 6 cu. yds. to and including 8 cu. yds.	12.86	2.51
Over 8 cu. yds. to and including 10 cu. yds.	12.94	2.51
Over 10 cu. yds. additional $.08 per hour each additional 2 cu.yds. increment		
Distributor Driver	12.68	2.44
Dry Batch Trucks:		
3 batch or under	12.45	2.51
Over 3 batch to and including 5 batch	12.58	2.51
Over 5 batch to and including 10 batch	12.74	2.51
Over 10 batch to and including 15 batch	12.90	2.51
Over 15 batch additional $.15 per hour each additional 5 batch increment		
Pickup driver, hauling materials	12.55	2.51
Dumpman, Gravel Spreader Box Operator; Pilot Car	12.45	2.51
Dump Trucks and similar equipment, DW 20, 21, or Euclid Tractors, pulling P.R. 21 or similar Dump Wagons:		
Water level capacity, including Sideboards:		
7 cu.yds. or less	12.45	2.51

Modification Page 7

DECISION NO. MT81-5138 - Mod. 06
(46 FR 40419 - August 7, 1981)
Statewide, Montana

	Basic Hourly Rates	Fringe Benefits
Change: Modification No. 5, published in Volume 48, FR Page 5433, Modification Page No. 12, to read Decision No. MT81-5138 instead of CA82-5138		
Carpenters:		
Carpenters	$12.43	$2.46
Millwrights	13.43	2.46
Piledrivermen	12.68	2.46
Cement Masons:		
Cement Masons	12.28	1.70
Grinder, Bush Hammer and Clipping Pan preparing finished surface	12.43	1.70
Ironworkers:		
Area 1	15.16	3.05
Area 2	17.74	3.80
Area 3	15.16	3.05
Laborers:		
Group 2	10.71	2.20
Line Construction:		
Statewide, except Flathead, Lake and Lincoln Counties:		
Lineman, Pole Sprayer	16.27	.95+3½%
Cable Splicers	17.40	.95+3½%
Line Equipment Operator; Powderman	14.38	.95+3½%
Groundman	11.65	.95+3½%
Painters:		
Area 1:		
Brush or Roller, Prep work, Pot Tender	12.05	1.63
Wet Sandblasting, Brush or Roller application of cold tar, epoxies and acid resistant materials	14.05	1.63
Spray application of cold tar, epoxies and acid resistant materials	16.89	1.63
Paper or Vinyl Hanger	12.05	1.63
Structural Steel:		
Brush or Roller	13.55	1.63
Perfa-taping	$12.58	$1.63
Structural Steel:		
Spraying	12.08	1.63
Airless Spraying	12.08	1.63
Area 2:		
Brush; Roller; Floor Layers	12.75	1.63
Brush, Roller on steel and roofs, Pot Tender, and Paperhanger	12.20	1.63
Perfataper (hand tools)	12.06	1.63
Sprsy (not steel)	12.95	1.63
Sandblaster, commercial and steel; Spray on structural steel and tanks	13.20	1.63
Perfstaper (machine tools)	12.46	1.63
Area 3:		
Painter	10.52	
Paint Mitts	13.30	
Perfa-taping	10.57	
Application of cold tar products, epoxies, polyurethanes and acid resistant paints; Water Sandblasting and Steam cleaning; Stacks and steeples; Brushing of steel; Spraying and airless spraying; Work over 30 ft.	13.30	
Area 4:		
Painter, Brush, Preparatory work, Pot Tender, Roller up to 9 inches	12.47	1.54+1%
Paperhanger	12.97	1.54+1%
Brush and Roller on steel	12.47	1.54+1%
Water and Sandblasting; Application of cold tar products, epoxies, polyurethanes and acid resistant paints; Spraying and airless Spray	14.72	1.54+1%

DECISION NO. MT81-5138 (Cont'd)

	Basic Hourly Rates	Fringe Benefits
Roller over 9' long	$13.97	1.54+1%
Hand Taper	12.87	1.54+1%
Machine Taper	14.12	1.54+1%
Area 5	10.90	
Area 6	15.41	1.68
Area 7:		
Highway parking and marking traffic surface application Operator; Material Mixer; Sandblaster; Striper	13.00	1.54
The installation of plastic, metal or composition button, or lines used instead of paint.		
Plumbers:		
Area 1	18.53	1.85
Area 2	16.95	2.42
Area 3	16.45	1.95
Area 4	18.60	2.45
Sheet Metal Workers:		
Statewide	15.71	3.06

DECISION NO. MT81-5138 - Mod. 87
(46 FR 40439 - August 7, 1981)
Statewide, Montana

	Basic Hourly Rates	Fringe Benefits
Change:		
Laborers:		
Group 1	$10.60	$2.25
Group 2	10.71	2.25
Group 3	10.85	2.25
Group 4	11.85	2.25
Power Equipment Operators:		
For all Power Equipment Operator classifications issued in Modification #5 the Fringe Benefits should be $2.94		
DW 10, 15, 20 Tractor pulling Roller	12.73	2.94
Wagner Roller and similar type	13.01	2.94
Truck Drivers:		
Distributor Driver	12.63	2.51

DECISION NO. MT81-5138 - Mod. 88
(46 FR 40439 - August 7, 1981)
Statewide, Montana

Add:	Basic Hourly Rates	Fringe Benefits
Power Equipment Operators:		
Scraper, Single Engine	$13.44	2.94

SECTION K

CONTRACT ADMINISTRATION

K-1. Invoices

Invoices submitted for progress and final payments shall be forwarded to:

Assistant Area Manager for Construction
Huron Construction Office
P.O. Box 921
Huron, South Dakota 57350

K-2. Billing

If payment is to be made to an address different than that shown on Standard Form 21, the Contractor shall enter the complete address in the space provided below:

_____

_____

_____

_____

_____

K-3. Defective or Improper Invoices

Name (where applicable), title, phone number, office name, and complete mailing address, of officials of the business concern to be notified when the Government receives a defective or improper invoice.

_____

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SECTION L

INDEX OF GENERAL PROVISIONS

(Construction Contract)

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GENERAL PROVISIONS

Fixed Price

(Construction Contract)

1. DEFINITIONS

a. The term "head of the agency" or "Secretary" as used herein means the Secretary, the Deputy Secretary, or the Under Secretary; and the term "his duly authorized representative" means any person or persons or board (other than the Contracting Officer) authorized to act for the head of the agency or the Secretary.

b. The Term "Contracting Officer" as used herein means the person executing this contract on behalf of the Government and includes a duly appointed successor or authorized representative.

c. The term DOE means United States Department of Energy.

2. SPECIFICATIONS AND DRAWINGS

The Contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between the drawings and specifications, the specifications shall govern. In case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detail drawings and other information as he or she may consider necessary, unless otherwise provided.

3. CHANGES

a. The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make any changes in the work within the general scope of the contract, including but not limited to changes:

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Government-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

b. Any other written order or an oral order (which terms as used in this paragraph b. shall include direction, instruction, interpretation, or determination) from the Contracting Officer, which causes any such change, shall be treated as a change order under this clause, provided that the Contractor gives the Contracting Officer written notice stating the date, circumstances, and source of the order and that the Contractor regards the order as a change order.

c. Except as herein provided, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment hereunder.

d. If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any order, an equitable adjustment shall be made and the contract modified in writing accordingly: Provided, however, That except on claims based on defective specifications, no claim for any change under b. above shall be allowed for any costs incurred more than 20 days before the Contractor gives written notice as therein required: And provided further, That in the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with such defective specifications.

e. If the Contractor intends to assert a claim for an equitable adjustment under this clause, it must, within 30 days after receipt of a written change order under a. above or the furnishing of a written notice under b. above, submit to the Contracting Officer a written statement setting forth the general nature and monetary extent of such claim, unless this period is extended by the Government. The statement of claim hereunder may be included in the notice under b. above.

f. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

4. DIFFERING SITE CONDITIONS

a. The Contractor shall promptly, and before such conditions are disturbed, notify the Contracting Officer in writing of: (1) subsurface or latent physical conditons at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The Contracting Officer shall promptly investigate the conditions, and if he or she finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work, under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

b. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in a. above; provided, however, the time prescribed therefor may be extended by the Government.

c. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

5. TERMINATION FOR DEFAULT - DAMAGES FOR DELAY - TIME EXTENSIONS

The provisions of this clause shall be applicable only if the amount of this contract exceeds $10,000.

a. If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will ensure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the Government may, by written notice to the Contractor, terminate its right to proceed with the work or such part of the work as to which there has been delay. In such event the Government may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. Whether or not the Contractor's right to proceed with the work is terminated, it and its sureties shall be liable for any damage to the Government resulting from its refusal or failure to complete the work within the specified time.

b. If fixed and agreed liquidated damages are provided in the contract and if the Government so terminates the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

c. If fixed and agreed liquidated damages are provided in the contract, and if the Government does not so terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the work is completed or accepted.

d. The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

(1) The delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, acts of the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another Contractor in the performance of a contract with the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors or suppliers arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any such delay (unless the Contracting Officer grants a further period of time before the date of final payment under the contract), notifies the Contracting Officer in writing of the causes of delay.

The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his or her judgment, the findings of fact justify such an extension, and his or her findings of fact shall be final and conclusive on the parties, subject only to appeal as provided in clause 6 of these General Provisions.

e. If after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, the rights and obligations of the parties shall, if the contract contains a clause providing for termination for convenience of the Government, be the same as if the notice of termination had been issued pursuant to such clause. If, under the foregoing circumstances, this contract does not contain a clause providing for termination for convenience of the Government, the contract shall be equitably adjusted to compensate for such termination and the contract modified accordingly; failure to agree to any such adjustment shall be a dispute concerning a question of fact within the meaning of the clause of this contract entitled "Disputes."

f. The rights and remedies of the Government provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

g. As used in paragraph d.(1) of this clause, the term "subcontractors or suppliers" means subcontractors or suppliers at any tier.

6. DISPUTES

a. This contract is subject to the Contract Disputes Act of 1978 (Public Law 95-563).

b. Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved in accordance with this clause.

c. (1) As used herein, "claim" means a written demand or assertion by one of the parties seeking, as a legal right, the payment of money, adjustment, or interpretation of contract terms, or other relief, arising under or relating to this contract.

(2) A voucher, invoice, or request for payment that is not in dispute when submitted is not a claim for the purposes of the Act. However, where such submission is subsequently not acted upon in a reasonable time, or disputed either as to liability or amount, it may be converted to a claim pursuant to the Act.

(3) A claim by the Contractor shall be made in writing and submitted to the Contracting Officer for decision. A claim by the Government against the Contractor shall be subject to a decision by the Contracting Officer.

d. For Contractor claims of more than $50,000, the Contractor shall submit with the claim a certification that the claim is made in good faith; the supporting data are accurate and complete to the best of the Contractor's knowledge and belief; and the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable. The certification shall be executed by the Contractor, if an individual. When the Contractor is not an individual, the certification shall be executed by a senior company official in charge at the Contractor's plant or location involved, or by an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

e. For Contractor claims of $50,000 or less, the Contracting Officer must render a decision within 60 days. For Contractor claims in excess of $50,000, the Contracting Officer must decide the claim within 60 days or notify the Contractor of the date when the decision will be made.

f. The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

g. The authority of the Contracting Officer under the Act does not extend to claims or disputes which by statute or regulation other agencies are expressly authorized to decide.

h. Interest on the amount found due on a Contractor claim shall be paid from the date the claim is received by the Contracting Officer until the date of payment.

i. Except as the parties may otherwise agree, pending final resolution of a claim by the Contractor arising under the contract, the Contractor shall proceed diligently with the performance of the contract in accordance with the Contracting Officer's decision.

7. PAYMENTS TO CONTRACTOR

a. The Government will pay the contract price as hereinafter provided.

b. The Government will make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates approved by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates the

Contracting Officer, at his or her discretion, may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration (1) if such consideration is specifically authorized by the contract and (2) if the Contractor furnishes satisfactory evidence that he or she has acquired title to such material and that it will be utilized on the work covered by this contract.

c. In making such progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, he or she may authorize such payment to be made in full without retention of a percentage. Also, whenever the work is substantially complete, the Contracting Officer shall retain an amount he or she considers adequate for the protection of the Government, and, at his or her discretion, may release to the Contractor all or a portion of any excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

d. All material and work covered by progress payments made shall thereupon become the sole property of the Government, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work or as waiving the right of the Government to require the fulfillment of all of the terms of the contract.

e. If Miller Act (40 U.S.C. 270a-270e) performance or payment bonds are required under this contract, the Government shall pay to the Contractor the total premiums paid by the Contractor to obtain bonds. This payment shall be paid at one time to the Contractor together with the first progress payment otherwise due after the Contractor has (1) furnished the bonds (including coinsurance and reinsurance agreements, when applicable), (2) furnished evidence of full payment to the surety company, and (3) submitted a request for such payment. The payment by the Government of the bond premiums to the Contractor shall not be made as increments of the individual progress payments and shall not be in addition to the contract price.

f. Upon completion and acceptance of all work, the amount due the Contractor under this contract shall be paid upon the presentation of a properly executed voucher and after the Contractor has furnished the Government with a release of all claims against the Government, arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), a release may also be required of the asignee.

8. ASSIGNMENT OF CLAIMS

a. Pursuant to the provisions of the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15) if this contract provides for payments aggregating $1,000 or more, claims for monies due or to become due the Contractor from the Government under this contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment shall cover all amounts payable under this contract and not already paid, and shall not be made to more than one party, except that any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Unless otherwise provided in this contract, payments to an assignee of any monies due or to become due under this contract shall not, to the extent provided in said Act, as amended, be subject to reduction or set off. (The preceeding sentence applies only if this contract is made in time of war or national emergency as defined in said Act; and is with the Department of Defense, the General Services Administration, the Energy Research and Development Administration, the National Aeronautics and Space Administration, the Federal Aviation Administration, or any other department or agency of the United States designated by the President pursuant to clause 4 of the provision of section 1 of the Assignment of Claims Act of 1940, as amended by the Act of May 15, 1951, 65 Stat. 41.)

b. In no event shall copies of this contract or of any plans, specifications, or other similar documents relating to work under this contract, if marked "Top Secret," "Secret," or "Confidential" be furnished to any assignee of any claim arising under this contract or to any other person not entitled to receive the same. However, a copy of any part or all of this contract so marked may be furnished, or any information contained therein may be disclosed, to such assignee upon the prior written authorization of the Contracting Officer.

9. MATERIAL AND WORKMANSHIP

a. Unless otherwise specifically provided in this contract, all equipment, material, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in this contract, reference to any equipment, material, article, or patented process, by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition and the Contractor may, at its option, use any equipment, material, article, or process, which, in the judgment of the Contracting Officer, is equal to that named. The Contractor shall furnish to the Contracting Officer for his or her approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature, and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the work. When required by this contract or when called for by the Contracting Officer, the Contractor shall furnish the Contracting Officer for approval full information concerning the material or articles which it contemplates incorporating in the work. When so directed,

samples shall be submitted for approval at the Contractor's expense with all shipping charges prepaid. Machinery, equipment, material, and articles installed or used without required approval shall be at the risk of subsequent rejection.

b. All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may, in writing, require the Contractor to remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

10. INSPECTION AND ACCEPTANCE

a. All work (which term includes but is not restricted to materials, workmanship, and manufacture and fabrication of components) shall be subject to inspection and test by the Government at all reasonable times and at all places prior to acceptance. Any such inspection and test is for the sole benefit of the Government and shall not relieve the Contractor of the responsibility of providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the Government shall be construed as constituting or implying acceptance. Inspection or test shall not relieve the Contractor of responsibililty for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Government after acceptance of the completed work under the terms of paragraph f. of this clause, except as hereinabove provided.

b. The Contractor shall, without charge, replace any material or correct any workmanship found by the Government not to conform to the contract requirements, unless in the public interest the Government consents to accept such material or workmanship with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

c. If the Contractor does not promptly replace rejected material or correct rejected workmanship, the Government (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with the clause of this contract entitled "Termination for Default - Damages for Delay - Time Extensions."

d. The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reasonably needed for performing such safe, and convenient inspection and test as may be required by the Contracting Officer. All inspections and tests by the Government shall be performed in such a manner as not unnecessarily to delay the work. Special, full-size, and performance tests shall be performed as described in this contract. The Government reserves the right to charge to the Contractor any additional cost of inspection or test when material or workmanship is not ready at the time specified by the Contractor for inspection or retest is necessitated by prior rejection.

e. Should it be considered necessary or advisable by the Government at any time before acceptance of the entire work to make an examination of work already completed, by removing or tearing out same, the Contractor

shall, on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, it shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, it shall, in addition, be granted a suitable extension of time.

f. Unless otherwise provided in this contract, acceptance by the Government shall be made as promptly as practicable after completion and inspection of all work required by the contract, or that portion of the work that the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Government's rights under any warranty or guarantee.

11. SUPERINTENDENCE BY CONTRACTOR

The Contractor, at all times during performance and until the work is completed and accepted, shall give its personal superintendence to the work or have on the work a competent superintendent, satisfactory to the Contracting Officer and with authority to act for the Contractor.

12. PERMITS AND RESPONSIBILITIES

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable Federal, State, and municipal laws, codes, and regulations, in connection with the prosecution of the work. It shall be similarly responsible for all damages to persons or property that occur as a result of his fault or negligence. It shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. It shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire construction work, except for any completed unit of construction thereof which theretofore may have been accepted.

13. CONDITIONS AFFECTING THE WORK

The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Any failure by the Contractor to do so will not relieve it from responsibility for successfully performing the work without additional expense to the Government. The Government assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of this contract, unless such understanding or representations by the Government are expressly stated in the contract.

14. OTHER CONTRACTS

The Government may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other Contractors and Government employees and carefully fit its own work to such additional work as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor or by Government employees.

15. SHOP DRAWINGS

a. The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

b. If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate his or her approval or disapproval of the shop drawings and if not approved as submitted shall indicate his or her reasons therefor. Any work done prior to such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with c. below.

c. If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation(s), he or she shall issue an appropriate contract modification, except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued.

16. USE AND POSSESSION PRIOR TO COMPLETION

The Government shall have the right to take possession of or use any completed or partially completed part of the work. Prior to such possession or use, the Contracting Officer shall furnish the Contractor an itemized list of work remaining to be performed or corrected on such portions of the project as are to be possessed or used by the Government, provided that failure to list any item of work shall not relieve the Contractor of responsibility for compliance with the terms of the contract. Such possession or use shall not be deemed an acceptance of any work under the contract. While the Government has such possession or use, the Contractor, notwithstanding the provisions of the clause of this contract entitled "Permits and Responsibilities," shall be relieved of the responsibility for the loss or damage to the work resulting from the

Government's possession or use. If such prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment in the contract price or the time of completion will be made and the contract shall be modified in writing accordingly.

17. SUSPENSION OF WORK

a. The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he or she may determine to be appropriate for the convenience of the Government.

b. If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of the Contracting Officer in the administration of this contract or by his or her failure to act within the time specified in this contract (or if no time is specified, within a reasonable time), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent (1) that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or (2) for which an equitable adjustment is provided for or excluded under any other provision of this contract.

c. No claim under this clause shall be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment under the contract.

18. TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

a. The performance of work under this contract may be terminated by the Government in accordance with this clause in whole, or from time to time in part, whenever the Contracting Officer shall determine that such termination is in the best interest of the Government. Any such termination shall be affected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of work under the contract is terminated and the date upon which such termination becomes effective.

b. After receipt of a Notice of Termination, and except as otherwise directed by the Contracting Officer, the Contractor shall:

(1) Stop work under the contract on the date and to the extent specified in the Notice of Termination;

(2) Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the work under the contract as is not terminated.

(3) Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the Notice of Termination;

(4) Assign to the Government, in the manner, at the times, and to the extent directed by the Contracting Officer all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the Government shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(5) Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Contracting Officer to the extent he or she may require, which approval or ratification shall be final for all purposes of this clause;

(6) Transfer title to the Government and deliver in the manner, at the times, and to the extent, if any, directed by the Contracting Officer, (a) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the Notice of Termination, and (b) the completed or partially completed plans, drawings, information, and other property which, if the contract had been completed, would have been required to be furnished to the Government;

(7) Use its best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the Contracting Officer, any property of the types referred to in (6) above; provided however, that the Contractor (a) shall not be required to extend credit to any purchaser, and (b) may acquire any such property under the conditions prescribed and at a price or prices approved by the Contracting Officer; and provided further, that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the Government to the Contractor under this contract or shall otherwise be credited to the price or cost of the work covered by this contract or paid in such other manner as the Contracting Officer may direct;

(8) Complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

(9) Take such action as may be necessary, or as the Contracting Officer may direct, for the protection and preservation of the property related to this contract which is in the possession of the Contractor and in which the Government has or may acquire an interest.

At any time after expiration of the plant clearance period, as defined in subpart 1-8.1 of the Federal Procurement Regulations (41 CFR 1-8.1), as the definition may be amended from time to time, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Contracting Officer, and may request the Government to remove such items or enter into a storage agreement covering them. Not later than 15 days thereafter, the Government will accept title to such items and remove them or enter into a storage agreement covering the same; provided, that the list submitted shall be subject to verification by the Contracting Officer upon removal of the items or, if the items are stored, within 45 days from the date of submission of the list, and any necessary adjustment to correct the list as submitted shall be made prior to final settlement.

c. After receipt of a Notice of Termination, the Contractor shall submit to the Contracting Officer its termination claim, in the form and with the certification prescribed by the Contracting Officer. Such claim shall be submitted promptly but in no event later than 1 year from the effective date of termination, unless one or more extensions in writing are granted by the Contracting Officer upon request of the Contractor made in writing within such 1-year period or authorized extension thereof. However, if the Contracting Officer determines that the facts justify such action, he or she may receive and act upon any such termination claim at any time after such 1-year period or extension thereof. Upon failure of the Contractor to submit its termination claim within the time allowed, the Contracting Officer may, subject to any review required by the Department of Energy's procedures in effect as of the date of execution of this contract, determine, on the basis of information available to him or her, the amount, if any, due to the Contractor by reason of the termination and shall therefor pay to the Contractor the amount so determined.

d. Subject to the provisions in paragraph c, and subject to any review required by the Department of Energy's procedures in effect as of the date of execution of this contract, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of work pursuant to this clause, which amount or amounts may include a reasonable allowance for profit on work done: Provided, That such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. The contract shall be amended accordingly, and the Contractor shall be paid the agreed amount. Nothing in paragraph e. of this clause, prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the Contracting Officer to agree upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, shall be deemed to limit, restrict, or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this paragraph d.

e. In the event of the failure of the Contractor and the Contracting Officer to agree as provided in paragraph d. upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, the Contracting Officer shall, subject to any review required by the Department of Energy's procedures in effect as of the date of execution of this contract, determine, on the basis of information available to him or her, the amount, if any, due to the Contractor by reason of the termination and shall pay to the Contractor the amounts determined as follows:

(1) With respect to all contract work performed prior to the effective date of the Notice of Termination, the total (without duplication of any items) of--

(a) The cost of such work;

(b) The cost of settling and paying claims arising out of the termination of work under subcontracts or orders as provided in paragraph b.5. above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of work under this contract, which amounts shall be included in the cost on account of which payment is made under (a) above; and

(c) A sum, as profit on (a) above, determined by the Contracting Officer pursuant to 1-8.303 of the Federal Procurement Regulations (41 CFR 1-8.303), in effect as of the date of execution of this contract, to be fair and reasonable: Provided, however, That if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, no profit shall be included or allowed under this subdivision (c) and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss; and

(2) The reasonable cost of the preservation and protection of property incurred pursuant to paragraph b.9. and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the Contractor as the result of the termination of work under this contract. The total sum to be paid to the Contractor under (1) above shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. Except for normal spoilage, and except to the extent that the Government shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor under (1) above, the fair value as determined by the Contracting Officer, of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government, or to a buyer pursuant to paragraph b.(7).

f. Costs claimed, agreed to, or determined pursuant to paragraphs c., d., and e. of this clause shall be in accordance with the contract cost principles and procedures in Part 1-15 of the Federal Procurement Regulations (41 CFR 1-15) as supplemented or modified by DOE PR part 9-15.2 (41 CFR 9-15.2) in effect on the date of this contract.

g. The Contractor shall have the right of appeal, under the clause of this contract entitled "Disputes," from any determination made by the Contracting Officer under paragraph c. or e. above, except that, if the Contractor has failed to submit its claim within the time provided in paragraph c. above and has failed to request extension of such time, it shall have no such right of appeal. In any case where the Contracting Officer has made a determination of the amount due under paragraph c. or e. above, the Government shall pay to the Contractor the following: (1) if there is no right of appeal hereunder or if no timely appeal has been taken, the amount so determined by the Contracting Officer, or (2) if an appeal has been taken, the amount finally determined on such appeal.

h. In arriving at the amount due the Contractor under this clause there shall be deducted (1) all unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this contract, (2) any claim which the Government may have against the Contractor in connection with this contract, and (3) the agreed price for, or the proceeds of sale of, any materials, supplies, or other things kept by the Contractor or sold, pursuant to the provisions of this clause, and not otherwise recovered by or credited to the Government.

i. If the termination hereunder be partial, prior to the settlement of the terminated portion of this contract the Contractor may file with the Contracting Officer a request in writing for an equitable adjustment of the price or prices specified in the contract relating to the continued portion of the contract (the portion not terminated by the Notice of Termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices; however, nothing contained herein shall limit the right of the Government and the Contractor to agree upon the amount or amounts to be paid to the Contractor for the completion of the continued portion of the contract when said contract does not contain an established contract price for such continued portion.

j. The Government may from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this contract whenever in the opinion of the Contracting Officer the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this clause, such excess shall be payable by the Contractor to the Government upon demand, together with interest, computed at the rate established by the Secretary of the Treasury pursuant to Pub. L. 92-41 (50 U.S.C. App. 1215 (b) (2)) for the Renegotiation Board, for the period from the date such excess payment is received by the Contractor to the date on which such excess is repaid to the Government: Provided, however, That no interest shall be charged with respect to any such excess payment

attributable to a reduction in the Contractor's claim by reason of retention or other disposition of termination inventory until 10 days after the date of such retention or disposition, or such later date as determined by the Contracting Officer by reason of the circumstances.

k. Unless otherwise provided for in this contract, or by applicable statute, the Contractor, from the effective date of termination and for a period of 3 years after final settlement under this contract, shall preserve and make available to the Government at all reasonable times at the office of the Contractor, but without direct charge to the Government, all its books, records, documents, and other evidence bearing on the costs and expenses of the Contractor under this contract and relating to the work terminated hereunder, or, to the extent approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions

19. PRICING OF ADJUSTMENTS

When costs are a factor in any determination of a contract price adjustment pursuant to the "Changes" clause or any other provision of this contract, such costs shall be in accordance with the Contract Cost Principles and Procedures in Part 1-15 of the Federal Procurement Regulations (41 CFR 1-15) as supplemented or modified by DOE PR Part 9-15.2 (41 CFR 9-15.2) in effect on the date of this contract.

20. PATENT INDEMNITY

If the amount of this contract is in excess of $10,000, the Contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of any United States letters patent (except U.S. letters patent issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) arising out of the manufacture or delivery of supplies or out of construction, alteration, modification, or repair of real property (herinafter referred to as "construction work") under this contract or out of the use or disposal by or for the account of the Government of such supplies or construction work. The foregoing indemnity shall not apply unless the Contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply to: (a) An infringement resulting from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner of performance of the contract not normally used by the Contractor; or (b) An infringement resulting from addition to or change in, such supplies or components furnished or construction work performed which addition or change was made subsequent to delivery or performance by the Contractor; or (c) A claimed infringement which is settled without the consent of the Contractor, unless required by final decree of a court of competent jurisdiction.

21. ADDITIONAL BOND SECURITY

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the Government, or if any such surety fails to furnish reports as to his or her financial condition from time to time as requested by the Government, or if the contract price is increased to such an extent that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interest of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by this contract.

22. EXAMINATION OF RECORDS BY COMPTROLLER GENERAL

a. This clause is applicable if the amount of this contract exceeds $10,000 and was entered into by means of negotiation, including small business restricted advertising, but is not applicable if this contract was entered into by means of formal advertising.

b. The Contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under this contract unless the DOE authorizes their prior disposition, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract.

c. The Contractor further agrees to include in all its subcontracts hereunder a provision to the effect that the subcontractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under the subcontract unless the DOE authorizes their prior disposition, have access to and the right to examine any directly pertinent books, documents, papers, and records of such subcontractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes (1) purchase orders not exceeding $10,000 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

d. The periods of access and examination described in b. and c. above for records which relate to (1) appeals under the "Disputes" clause of this contract, (2) litigation or the settlement of claims arising out of the performance of this contract, or (3) costs and expenses of this contract as to which exception has been taken by the Comptroller General or any of his duly authorized representatives, shall continue until such appeals, litigation, claims, or exceptions have been disposed of.

e. Nothing in this contract shall be deemed to preclude an audit by the General Accounting Office of any transaction under this contract.

23. BUY AMERICAN

a. Agreement. In accordance with the Buy American Act (41 U.S.C. 10a-10d), and Executive Order 10582, December 17, 1954 (3 CFR, 1954-58 Comp., p. 230), as amended by Executive Order 11051, September 27, 1962 (3 CFR, 1959-63 Comp., p. 635), the Contractor agrees that only domestic construction material will be used (by the Contractor, subcontractors, materialmen, and suppliers) in the performance of this contract, except for nondomestic material listed in the contract.

b. Domestic Construction Material. "Construction material" means any article, material, or supply brought to the construction site for incorporation in the building or work. An unmanufactured construction material is a "domestic construction material" if it has been mined or produced in the United States. A manufactured construction material is a "domestic construction material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

c. Domestic Component. A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

24. EQUAL OPPORTUNITY

(The following clause is applicable unless this contract is exempt under the rules, regulations, and relevant orders of the Secretary of Labor (41 CFR, ch. 60).)

During the performance of this contract, the Contractor agrees as follows:

a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this "Equal Opportunity" clause.

b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

c. The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency Contracting Officer, advising the labor union or workers' representative of the Contractor's commitments under this "Equal Opportunity" clause, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

e. The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

f. In the event of the Contractor's noncompliance with the "Equal Opportunity" clause of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

g. The Contractor will include the provisions of paragraphs a. through g. in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

25. COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

26. OFFICIALS NOT TO BENEFIT

No member of or delegate of Congress or resident Commissioner shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

27. CONVICT LABOR

In connection with the performance of work under this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment except as provided by Public Law 89-176, September 10, 1965 (18 U.S.C. 4082(c)(2)) and Executive Order 11755, December 29, 1973.

28. FEDERAL, STATE, AND LOCAL TAXES

a. Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State, and local taxes and duties.

b. Nevertheless, with respect to any Federal excise tax or duty on the transactions or property covered by this contract, if a statute, court decision, written ruling, or regulation takes effect after the contract date, and--

(1) Results in the Contractor being required to pay or bear the burden of any such Federal excise tax or duty or increase in the rate thereof which would not otherwise have been payable on such transactions or property, the contract price shall be increased by the amount of such tax or duty or rate increase: Provided, that the Contractor if requested by the Contracting Officer, warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price as a contingency reserve or otherwise; or

(2) Results in the Contractor not being required to pay or bear the burden of, or in its obtaining a refund or drawback of, any such Federal excise tax or duty which would otherwise have been payable on such transactions or property or which was the basis of an increase in the contract price, the contract price shall be decreased by the amount of the relief, refund, or drawback or the amount shall be paid to the Government, as directed by the Contracting Officer. The contract price shall be similarly decreased if the Contractor, through

its fault or negligence or its failure to follow instructions of the Contracting Officer, is required to pay or bear the burden of, or does not obtain a refund or drawback of, any such Federal excise tax or duty.

c. No adjustment pursuant to paragraph b. above will be made under this contract unless the aggregate amount thereof is or may reasonably be expected to be over $100.

d. As used in paragraph b. above, the term "contract date" means the date set for the bid opening, or if this is a negotiated contract, the date of this contract. As to additional supplies or services procured by modification to this contract, the term "contract date" means the date of such modification.

e. Unless there does not exist any reasonable basis to sustain an exemption, the Government, upon request of the Contractor, without further liability, agrees, except as otherwise provided in this contract, to furnish evidence appropriate to establish exemption from any tax which the Contractor warrants in writing was excluded from the contract price. In addition, the Contracting Officer may furnish evidence to establish exemption from any tax that may, pursuant to this clause, give rise to either an increase or decrease in the contract price. Except as otherwise provided in this contract, evidence appropriate to establish exemption from duties will be furnished only at the discretion of the Contracting Officer.

f. The Contractor shall promptly notify the Contracting Officer of matters which will result in either an increase or decrease in the contract price, and shall take action with respect thereto as directed by the Contracting Officer.

29. DAVIS-BACON ACT (40 U.S.C. 276a-276a-7)

(a) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such

weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill except as provided in the clause entitled "Apprentices and Trainees." Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator of the Wage and Hour Division, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of

the Contracting Officer, to the Administrator for determination. The Administrator of the Wage and Hour Division, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (b)(2) or (b)(3) of this clause, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(c) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(d) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the Contractor, that applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(e) Paragraphs (a) through (d) of the clause shall apply to this contract to the extent that it is (1) a prime contract with the Government subject to the Davis-Bacon Act, or (2) a subcontract also subject to the Davis-Bacon Act under such prime contract.

30. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION (40 U.S.C. 327-333)

This contract is subject to the Contract Work Hours and Safety Standards Act and to the applicable rules, regulations, and interpretations of the Secretary of Labor.

(a) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 8 hours in any calendar day or in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 8 hours in any calendar day or in excess of forty hours in such workweek, whichever is greater.

(b) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in paragraph (a) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory to such District

or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the provisions set forth in paragraph (a) of this clause, in the sum of $10 for each calendar day for which such individual was required or permitted to work in excess of 8 hours or in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in paragraph (a) of this clause.

(c) Withholdings for unpaid wages and liquidated damages. The Contracting Officer shall upon his/her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same Prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in paragraph (a) of this clause.

(d) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the provisions set forth in paragraphs (a) through (d) of this clause and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the provision set forth in paragraphs (a) through (d) of this clause.

31. APPRENTICES AND TRAINEES

(a) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the jobsite in any craft classification shall not be greater than the ratio permitted to the Contractor as to its entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the jobsite in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate

specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the jobsite shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the jobsite in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination of the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

32. PAYROLLS AND BASIC RECORDS

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of

the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under paragraph (d) of the clause entitled "Davis-Bacon Act" that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprenticeships and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. The information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents, Government Printing Office. The Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accomplished by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause entitled "Payrolls and Basic Records" and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b)(2) of this clause.

(4) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or the Department of Labor or their authorized representatives. The Contractor and subcontractors shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

33. COMPLIANCE WITH COPELAND ACT REQUIREMENT

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

34. WITHHOLDING

The Contracting Officer shall upon his/her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Prime Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

35. SUBCONTRACTS

The Contractor or subcontractor shall insert in any subcontracts the clauses entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act--Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Act Requirements," "Withholding," "Subcontracts," "Contract Termination-Debarment," "Disputes Concerning Labor Standards," "Compliance With Davis-Bacon and Related Act Requirements," and "Certification of Eligibility," and such other clauses as the Contracting Officer may be appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited above.

36. CONTRACT TERMINATION; DEBARMENT

A breach of the contract clauses entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act--Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Act Requirements," "Subcontracts," "Compliance with Davis-Bacon and Related Act Requirements," and "Certification of Eligibility," may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.

37. DISPUTES CONCERNING LABOR STANDARDS

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

38. COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REQUIREMENTS

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

39. NOTICE TO THE GOVERNMENT OF LABOR DISPUTES

a. Whenever the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice thereof, including all relevant information with respect thereto, to the Contracting Officer.

b. The Contractor agrees to insert the substance of this clause, including this paragraph b., in any subcontract hereunder as to which a labor dispute may delay the timely performance of this contract, except that each such subcontract shall provide that, in the event its timely performance is delayed or threatened by delay by any actual or potential labor

dispute, the subcontractor shall immediately notify its next higher tier subcontractor, or the Prime Contractor as the case may be, of all relevant information with respect to such dispute.

40. REPORTING OF ROYALTIES

If this contract is in an amount which exceeds $10,000 and if any royalty payments are directly involved in the contract or are reflected in the contract price to the Government, the Contractor agrees to report in writing to the Patent Counsel with notification by Patent Counsel to the Contracting Officer during the performance of this contract and prior to its completion or final settlement the amount of any royalties or other payments paid or to be paid by it directly to others in connection with the performance of this contract together with the names and addresses of licensors to whom such payments are made and either the patent numbers involved or such other information as will permit the identification of the patents or other basis on which the royalties are to be paid. The approval of DOE of any individual payments or royalties shall not stop the Government at any time from contesting the enforceability, validity, or scope of, or title to, any patent under which a royalty or payments are made.

41. NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT

The provisions of this clause shall be applicable only if the amount of this contract exceeds $10,000.

a. The Contractor shall report to the Contracting Officer, promptly and in reasonably written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

b. In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed hereunder, the Contractor shall furnish to the Government when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

c. This clause shall be included in all subcontracts.

42. CLEAN AIR AND WATER

(Applicable only if the contract exceeds $100,000, or the Contracting Officer has determined that orders under an indefinite quantity contract in any 1 year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or the contract is not otherwise exempt.)

a. The Contractor agrees as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Pub. L. 91-604) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued thereunder before the award of this contract.

(2) That no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this contract was awarded unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use his best efforts to comply with clean air standards and clean water standards at the facility in which the contract is being performed.

(4) To insert the substance of the provisions of this clause into any nonexempt subcontract, including this paragraph (a)(4).

b. The terms used in this clause have the following meanings:

(1) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Public law 91-604).

(2) The term "Water Act" means the Federal Water and Pollution Control Act, as amended (33 U.S.C. 1251, et seq., as amended by Public Law 92-500).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act on Executive Order 11738, an applicable implementation as described in section 110(d) of the Clean Air Act (42 U.S.C. 1857c-5(d)), an approved implementation procedure or plan under section 111(c) or (d), or an approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 1857c-7(d)).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standard, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharter by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by a local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

(5) The term "compliance" means compliance with clean air or water standards. Compliance shall also mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency, or an air or water pollution control agency in accordance with the requirement of the Air Act or Water Act and regulations issued pursuant thereto.

(6) The term "facility" means any building, plant, installation, structure, mine, vessel, or other floating craft, location, or site of operations, owned, leased, or supervised by a contractor or subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location or site shall be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are located in one geographical area.

43. AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS

This clause is applicable to all nonexempt contracts and subcontracts which exceed $2,500.

a. The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

b. The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Rehabilitation Act of 1973, as amended.

c. In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

d. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor, provided by or through the Contracting Officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

e. The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of

section 503 of the Act and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

f. The Contractor will include the provisions of this clause in every subcontract or purchase order of $2,500 or more unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director, Office of Federal Contract Compliance Programs, may direct to enforce such provisions, including action for noncompliance.

44. AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA

This clause is applicable pursuant to 41 CFR 60-250 if this contract is for $10,000 or more.

a. The Contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability of veterans status in all employment practices such as the following: employment upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

b. The Contractor agrees that all suitable employment openings of the Contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the Contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The Contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required. State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in paragraphs d. and e.

c. Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and nonveterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the Contractor from any requirements in Executive Orders or regulations regarding nondiscrimination in employment.

d. Reserved. 47 FR4258.

e. Whenever the Contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these provisions and has so advised the State system, there is no need to advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

f. This clause does not apply to the listing of employment openings which occur and are filled outside the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

g. The provisions of paragraphs b., c., d., and e. of the clause do not apply to openings which the Contractor proposes to fill from within its own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of its own organization or employer-union arrangement for that opening.

h. As used in this clause:

(1) "All suitable employment openings" include, but is not limited to, openings which occur in the following job categories: production and nonproduction; plant and office; laborers and mechanics; supervisory and nonsupervisory; technical, executive, administrative, and professional openings as are compensated on a salary basis of less than $25,000 per year. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment. It does not include openings which the Contractor proposes to fill from within its own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances, an employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State Employment Service System" means the local office of the Federal-State national system of public employment offices with assigned responsibility for servicing the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the Contractor proposes to fill from within its own organization" means employment openings for which no consideration will be given to persons outside the Contractor's organization

(including any affiliates, subsidiaries, and the parent companies) and includes any openings which the Contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the Contractor proposes to fill pursuant to a customary and traditional employer-union arrangement" means employment openings which the Contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the Contractor and representatives of its employees.

i. The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Vietnam Veterans Readjustment Act, hereafter referred to as the "Act" (38 U.S.C. 2012).

j. In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

k. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, provided by or through the Contracting Officer. Such notice shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

l. The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Vietnam Era Readjustment Assistance Act, and is committed to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era.

m. The Contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless excepted by rules, regulations, or orders of the Secretary of Labor issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

45. GOVERNMENT INSPECTORS

The work will be conducted under the general direction of the Contracting Officer and is subject to inspection by his or her appointed inspectors to ensure strict compliance with the terms of the contract. No inspector is authorized to change any provision of the specifications without

written authorization of the Contracting Officer, nor shall the presence or absence of an inspector relieve the Contractor from any requirements of the contract.

46. RIGHTS IN SHOP DRAWINGS

(Applicable to all contracts calling for the delivery of shop drawings.)

a. Shop drawings for construction means drawings submitted to the Government by the Construction Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (a) the proposed fabrication and assembly of structural elements and (b) the installation (i.e., form, fit, and attachment details) of materials and equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

b. This clause, including this paragraph b., shall be included in all subcontracts hereunder at any tier.

47. SUBCONTRACTORS

Within 7 days after the award of any subcontract, either by itself or a subcontractor, the Contractor shall deliver to the Contracting Officer a statement setting forth the name and address of the subcontractor and a summary description of the work subcontracted. The Contractor shall at the same time furnish a statement signed by the subcontractor acknowledging the inclusion in its subcontract of the clauses of this contract entitled "Equal Opportunity," "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act--Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Regulations," "Withholding of Funds," "Subcontracts," and "Contract Termination-Debarment." Nothing contained in this contract shall create any contractual relation between the subcontractor and the Government.

48. AUTHORIZATION AND CONSENT

The Government hereby gives its authorization and consent (without prejudice to any rights of indemnification) for all use and manufacture, in the performance of this contract or any part hereof or any amendment hereto or any subcontract hereunder (including any lower tier subcontract), of any invention described in and covered by a patent of the United States (a) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract or (b) utilized in the machinery, tools, or methods the use of which necessarily results from compliance by the Contractor or the using subcontractor with specifications or written provisions now or hereafter forming a part of this contract or specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clauses, if any, included in this contract or any subcontract hereunder (including any lower tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

49. SITE INVESTIGATION

The Contractor acknowledges that it has investigated and satisfied itself as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling, and storage of materials; availability of labor, water, electric power, roads; and uncertainties of weather, river stages, tides, or similar physical conditions at the site; the conformation and conditions of the ground; the character of equipment and facilities needed preliminary to and during prosecution of the work. The Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from information presented by the drawings and specifications made a part of this contract. Any failure by the Contractor to acquaint itself with the available information will not relieve it from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the Government.

50. CONTRACTOR INSPECTION SYSTEM

The Contractor shall (1) maintain an adequate inspection system and perform such inspections as will assure that the work performed under the contract conforms to contract requirements, and (2) maintain and make available to the Government adequate records of such inspections.

51. GRATUITIES

a. The Government may, by written notice to the Contractor, terminate the right of the Contractor to proceed under this contract if it is found, after notice and hearing by the Secretary or his duly authorized representative, that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Contractor, or any agent or representative of the Contractor, to any officer or employee of the Government with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making of any determinations with respect to the performing of such contract; provided, that the existence of the facts upon which the Secretary or his duly authorized representative makes such finds shall be an issue and may be reviewed in any competent court.

b. In the event this contract is terminated as provided in paragraph a. hereof, the Government shall be entitled (a) to pursue the same remedies against the Contractor as it could pursue in the event of a breach of the contract by the Contractor, and (b) as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages in an amount (as determined by the Secretary or his duly authorized representative) which shall be not less than three or more than ten times the costs incurred by the Contractor in providing any such gratuities to any such officer or employee.

c. The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

52. COMPOSITION OF CONTRACTOR

If the Contractor hereunder is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.

53. OPERATIONS AND STORAGE AREAS

a. All operations of the Contractor (including storage of materials) upon Government premises shall be confined to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by its operations.

b. Temporary buildings (storage sheds, shops, offices, etc.) may be erected by the Contractor only with the approval of the Contracting Officer, and shall be built with labor and materials furnished by the Contractor without expense to the Government. Such temporary buildings and utilities shall remain the property of the Contractor and shall be removed by it at its expense upon the completion of the work. With the written consent of the Contracting Officer, such buildings and utilities may be abandoned and need not be removed.

c. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways or construct and use such temporary roadways as may be authorized by the Contracting Officer. Where materials are transported in the prosecution of the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbings or sidewalks, protection against damage shall be provided by the Contractor; and any damaged roads, curbings, or sidewalks shall be repaired by, or at the expense of the Contractor.

54. CLEANING UP

The Contractor shall at all times keep the construction area, including storage areas used by it, free from accumulations of waste material or rubbish and prior to completion of the work remove any rubbish from the premises and all tools, scaffolding, equipment, and materials not the property of the Government. Upon completion of the construction, the Contractor shall leave the work and premises in a clean, neat, and workmanlike condition satisfactory to the Contracting Officer.

55. ADDITIONAL DEFINITIONS

a. Wherever in the specifications or upon the drawings the words "directed," "required," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the "direction," "requirement," "order," "designation," or "prescription" of the Contracting Officer is intended; and similarly the words "approved," "acceptable,"

"satisfactory," or words of like import shall mean "approved by," "acceptable to," or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

b. Where "as shown," "as indicated," "as detailed," or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provided completely in place;" that is, "furnished and installed."

56. MODIFICATION PROPOSALS - PRICE BREAKDOWN

The Contractor, in connection with any proposal it makes for a contract modification, shall furnish a price breakdown, itemized as required by the Contracting Officer. Unless otherwise directed, the breakdown shall be in sufficient detail to permit any analysis of all material, labor, equipment, subcontract, and overhead costs, as well as profit, and shall cover all work involved in the modification, whether such work was deleted, added, or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification therefor shall also be furnished. The proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Contracting Officer.

57. PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - PRICE ADJUSTMENT

(The following clause is applicable if this contract is in excess of $100,000.)

a. This clause shall become operative only with respect to any modification of this contract which involves aggregate increases and/or decreases in costs plus applicable profits in excess of $100,000 unless the modification is priced on the basis of adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The right to price reduction under this clause is limited to defects in data relating to such modification.

b. If any price, including profit or fee, negotiated in connection with any price adjustment under this contract, was increased by any significant sums because:

(1) The Contractor furnished cost or pricing data which was not accurate, complete, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data;

(2) A subcontractor, pursuant to the clause of this contract entitled "Subcontractor Cost or Pricing Data" or "Subcontractor Cost or Pricing Data--Price Adjustments" or any subcontract clause therein required, furnished cost or pricing data which was not accurate, complete, and current as certified in the subcontractor's Certificate of Current Cost or Pricing Data;

(3) A subcontractor or prospective subcontractor furnished cost or pricing data which was required to be accurate, complete, and current and to be submitted to support a subcontract cost estimate furnished by the Contractor but which was not accurate, complete, and current as of the date certified in the Contractor's Certificate of Current Cost or Pricing Data; or

(4) The Contractor or a subcontractor or prospective subcontractor furnished data, not within (1), (2), or (3) above, which was not accurate, as submitted, the price shall be reduced accordingly and the contract shall be modified in writing as may be necessary to reflect such reduction. However, any reduction in the contract price due to defective subcontract data of a prospective subcontractor, when the subcontract was not subsequently awarded to such subcontractor, will be limited to the amount (plus applicable overhead and profit markup) by which the actual subcontract, or actual cost of the Contractor if there was not subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided the actual subcontract price was not affected by defective cost or pricing data.

(Note: Since the contract is subject to reduction under this clause by reason of defective cost or pricing data submitted in connection with certain subcontracts, it is expected that the Contractor may wish to include a clause in each such subcontract requiring the subcontractor to appropriately indemnify the Contractor. It is also expected that any subcontractor subject to such indemnification will generally require substantially similar indemnification for defective cost or pricing data required to be submitted by its lower tier subcontractors.)

c. Failure to agree on a reduction shall be a dispute concerning a question or fact within the meaning of the "Disputes" clause of this contract.

58. AUDIT

(The following clause is applicable unless this contract was entered into by formal advertising and is not in excess of $100,000.)

a. General. The Contracting Officer or his representative shall have the audit and inspection rights described in the applicable paragraphs b., c., and d. below.

b. Examination of Costs. If this is a cost-reimbursement type, incentive, time and materials, labor hour, or price redeterminable contract, or any combination thereof, the Contractor shall maintain and the Contracting Officer or his representatives shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this contract. Such right of examination shall include inspection at all reasonable times of the Contractor's plants, or such parts thereof, as may be engaged in the performance of this contract.

c. Cost or Pricing Data. If the Contractor submitted cost or pricing data in connection with the pricing of this contract or any change or modification thereto, unless such pricing was based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, the Contracting Officer or representatives who are employees of the United States Government shall have the right to examine all books, records, documents, and other data of the Contractor related to the negotiation, pricing, or performance of such contract, change, or modification, for the purpose of evaluating the accuracy, completeness, and currency of the cost or pricing data submitted. Additionally, in the case of pricing any change or modification exceeding $100,000 to formally advertised contracts, the Comptroller General of the United States or his representatives who are employees of the United States Government shall have such rights. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used therein.

d. Availability. The materials described in b. and c. above shall be made available at the office of the Contractor, at all reasonable times for inspection, audit, or reproduction, until the expiration of 3 years from the date of final payment under this contract or such lesser time specified in Part 1-20 of the Federal Procurement Regulations (41 CFR Part 1-20) and for such longer period, if any, as is required by applicable statute, or by other clauses of this contract, or by (1) and (2) below:

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for a period of 3 years from the date of any resulting final settlement.

(2) Records which relate to appeals under the "Disputes" clause of this contract, or litigation or the settlement of claims arising out of the performance of this contract, shall be made available until such appeals, litigation, or claims have been disposed of.

e. The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph e., in all subcontracts hereunder except altered as necessary for proper identification of the contracting parties and the Contracting Officer under the Government prime contract.

59. SUBCONTRACTOR COST OR PRICING DATA - PRICE ADJUSTMENTS

(The following clause is applicable if this contract is in excess of $100,000.)

a. Paragraphs b. and c. of this clause shall become operative only with respect to any modification made pursuant to one or more provisions of this contract which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $100,000. The requirements of this clause shall be limited to such modifications.

b. The Contractor shall require subcontractors hereunder to submit cost or pricing data under the following circumstances:

(1) Prior to the award of any subcontract the amount of which is expected to exceed $100,000 when entered into;

(2) Prior to the pricing of any subcontract modification which involves aggregate increases and/or decreases in costs plus applicable profit expected to exceed $100,000, except where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or price set by law or regulation.

c. The Contractor shall require subcontractors to certify that to the best of its knowledge and belief that cost and pricing data submitted under b. above is accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract change or modification.

d. The Contractor shall insert the substance of this clause including this paragraph d. in each subcontract which exceeds $100,000.

60. INTEREST

Notwithstanding any other provision of this contract, unless paid within 30 days, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code) shall bear interest at the rate determined by the Secretary of the Treasury pursuant to Public Law 92-41, 85 Stat. 97. Amounts shall be due upon the earliest one of (a) the date fixed pursuant to this contract; (b) the date of the first written demand for payment, consistent with this contract, including demand consequent upon default termination; (c) the date of transmittal by the Government to the Contractor of a proposed supplemental agreement to confirm completed negotiations fixing the amount; or (d) if this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or in connection with a negotiated pricing agreement not confirmed by contract supplement.

61. CLASSIFICATION

In the performance of the work under this contract, the Contractor shall assign classifications to all documents, material, and equipment originated or generated by the Contractor in accordance with classification guidance furnished to the Contractor by the DOE. Every subcontract and purchase order issued hereunder involving the origination or generation of classified documents, material, or equipment shall include a provision to the effect that in the performance of such subcontract or purchase order, the subcontractor or supplier shall assign classifications to all such documents, material, and equipment in accordance with classification guidance furnished to such subcontractor or supplier by the contractor.

62. SECURITY

The following clause is applicable for all contracts and subcontracts, entered into under Section 31 (research assistance) or 41 (ownership and operation of production facilities) of the Atomic Energy Act, as amended,

and in other contracts and subcontracts the performance of which involve or is likely to involve restricted data, formerly restricted data, or other classified information.

a. Contractor's Duty to Safeguard Restricted Data, Formerly Restricted Data, and Other Classified Information. The Contractor shall, in accordance with DOE security regulations and requirements, be responsible for safeguarding restricted data, formerly restricted data, and other classified information and protecting against sabotage, espionage, loss, and theft, the classified documents and material in the Contractor's possession in connection with the performance of work under this contract. Except as otherwise expressly provided in this contract, the Contractor shall, upon completion or termination of this contract, transmit to DOE any classified matter in the possession of the Contractor or any person under the Contractor's control in connection with performance of this contract. If retention by the Contractor of any classified matter is required after the completion or termination of the contract and such retention is approved by the Contracting Officer, the Contractor will complete a certificate of possession to be furnished to DOE specifying the classified matter to be retained. The certification shall identify the items and types or categories of matter retained, the conditions governing the retention of the matter, and the period of retention, if known. If the retention is approved by the Contracting Officer, the security provisions of the contract will continue to be applicable to the matter retained.

b. Regulations. The Contractor agrees to conform to all security regulations and requirements of DOE.

c. Definition of Restricted Data. The term "restricted data," as used in this clause, means all data concerning (1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the restricted data category to section 142 of the Atomic Energy Act of 1954, as amended.

d. Definition of Formerly Restricted Data. The term "formerly restricted data," as used in this clause, means all data removed from the restricted data category under section 142 d. of the Atomic Energy Act of 1954, as amended.

e. Security Clearance of Personnel. The Contractor shall not permit any individual to have access to restricted data, formerly restricted data, or other classified information, except in accordance with the Atomic Energy Act of 1954, as amended, and the DOE's regulations or requirements applicable to the particular type of category of classified information to which access is required.

f. Criminal Liability. It is understood that disclosure of restricted data, formerly restricted data, or other classified information relating to the work or services ordered hereunder to any person not entitled to receive it, or failure to safeguard any restricted data, formerly restricted data, or any other classified matter that may come to the Contractor or

any person under the Contractor's control in connection with work under this contract, may subject the Contractor, its agents, employees, or subcontractors to criminal liability under the laws of the United States. (See the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2100, et seq.; 18 U.S.C. 793 and 794; and Executive Order 11652.)

63. PREFERENCE FOR U.S. FLAG AIR CARRIERS

a. Public Law 93-623 requires that all Federal agencies and Government contractors and subcontractors will use U.S. flag air carriers for international air transportation of personnel (and their personal effects) or property to the extent service by such carriers is available. It further provides that the Comptroller General of the United States shall disallow any expenditure from appropriated funds for international air transportation on other than a U.S. flag air carrier in the absence of satisfactory proof of the necessity therefor.

b. The Contractor agrees to utilize U.S. flag air carriers for international air transportation of personnel (and their personal effects) or property to the extent service by such carriers is available.

c. In the event that the Contractor selects a carrier other than a U.S. flag air carrier for international air transportation, it will include a certification on vouchers involving such transportation which is essentially as follows:

Certification of Unavailability of U.S. Flag Air Carriers.

I hereby certify that transportation service for personnel (and their personal effects) or property by certified air carrier was unavailable for the following reasons: 1. (state reasons).

d. The terms used in this clause have the following meanings:

(1) "International air transportation" means transportation of persons (and their personal effects) or property by air between a place in the United States and a place outside thereof or between two places both of which are outside the United States.

(2) "U.S. flag air carrier" means one of a class of air carriers holding a certificate of public convenience and necessity issued by the Civil Aeronautics Board, approved by the President, authorizing operations between the United States and/or its territories and one or more foreign countries.

(3) The term "United States" includes the 50 States, Commonwealth of Puerto Rico, possessions of the United States, and the District of Columbia.

e. The Contractor shall include the substance of this clause, including this paragraph e., in each subcontract or purchase order hereunder which may involve international air transportation.

64. USE OF U.S. FLAG COMMERCIAL VESSELS

a. The Cargo Preference Act of 1954 (Public Law 664, August 26, 1954, 68 Stat. 832, 46 U.S.C. 1241(b)) requires that Federal departments or agencies shall transport at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) of equipment, materials, or commodities which may be transported on ocean vessels on privately owned United States flag commercial vessels. Such transportation shall be accomplished whenever:

(1) Any equipment, materials, or commodities, within or outside the United States, which may be transported by ocean vessel, are:

(a) Procured, contracted for, or otherwise obtained for the agency's account; or

(b) Furnished to or for the account of any foreign nation without provision for reimbursement.

(2) Funds or credits are advanced or the convertibility of foreign currencies is guaranteed in connection with furnishing such equipment, materials, or commodities which may be transported by ocean vessel.

Note: This requirement does not apply to small purchases as defined in 41 CFR 1-3.6 or to cargoes carried in the vessels of the Panama Canal Company.

b. The Contractor agrees as follows:

(1) To utilize privately owned United States flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved whenever shipping any equipment, material, or commodities under the conditions set forth in a. above pursuant to this contract to the extent such vessels are available at fair and reasonable rates for United States flag commercial vessels.

Note: Guidance regarding fair and reasonable rates for United States flag vessels may be obtained from the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20230; Area Code 202, telephone 377-3449.

(2) To furnish, within 15 working days following the date of loading for shipments originating within the United States or within 25 working days following the date of loading for shipments originating outside the United States a legible copy of a rated, "onboard" commercial ocean bill of lading in English for each shipment of cargo covered by the provisions in a. above to both the Contracting Officer (through the prime contractor in the case of subcontractor bills of lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20230.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract except for small purchases as defined in 41 CFR 1-3.6 (FPR 1-7.603-19 and 1-19.108-2).

65. SUBCONTRACTS

(The provisions of this clause do not apply to firm fixed-price and fixed price with escalation (economic price adjustment) contracts. The clause does apply to new subcontracts or modifications of existing subcontracts which are necessitated because of unpriced contract changes pursuant to the "Changes" clause or other provisions of this contract.)

a. As used in this clause, the term "subcontract" includes purchase orders.

b. The Contractor shall notify the Contracting Officer reasonably in advance of entering into any subcontract if the Contractor's procurement system has not been approved by the Contracting Officer and if the subcontract:

(1) Is to be a cost-reimbursement, time and materials, or labor-hour contract which it is estimated will involve an amount in excess of $10,000 including any fee;

(2) Is proposed to exceed $100,000; or

(3) Is one of a number of subcontracts, under this contract, with a single subcontractor for the same or related supplies or services which, in the aggregate, are expected to exceed $100,000.

c. The advance notification required by paragraph b. above shall include:

(1) A description of the supplies or services to be called for by the subcontract;

(2) Identification of the proposed subcontractor and an explanation of why and how the proposed subcontractor was selected, including the competition obtained;

(3) The proposed subcontract price, together with the Contractor's cost or price analysis thereof;

(4) The subcontractor's current, complete, and accurate cost or pricing data and Certificate of Current Cost of Pricing Data, when such data and certificates are required by other provision of this contract to be obtained from the subcontractor;

(5) Identification of the type of subcontract to be used; and a copy of the proposed subcontract if it either exceeds $100,000 or is otherwise required by the Contracting Officer.

(6) A memorandum of negotiation which sets forth the principal elements of the subcontract price negotiations. A copy of this memorandum shall be retained in the Contractor's file for use of Government reviewing authorities. The memorandum shall be in

sufficient detail to reflect the most significant considerations controlling the establishment of initial or revised prices. The memorandum should include an explanation of why cost or pricing data was, or was not, required; and, if it was not required in the case of any price negotiation in excess of $100,000, a statement of the basis for determining that the price resulted from or was based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. If cost or pricing data was submitted and a certificate of cost or pricing data was required, the memorandum shall reflect the extent to which reliance was not placed upon the factual cost or pricing data submitted and the extent to which this data was not used by the Contractor in determining the total price objective and in negotiating the final price. The memorandum shall also reflect the extent to which it was recognized in the negotiation that any cost or pricing data submitted by the subcontractor was not accurate, complete, or current; the action taken by the Contractor and the subcontractor as a result; and the effect, if any, of such defective data on the total price negotiated. Where the total price negotiated differs significantly from the Contractor's total price objective, the memorandum shall explain this difference;

(7) When incentives are used, the memorandum of negotiation shall contain an explanation of the incentive fee profit plan identifying each critical performance element, management decisions used to quantify each incentive element, reasons for incentives on particular performance characteristics, and a brief summary of trade-off possibilities considered as to cost, performance, and time; and

(8) The subcontractor's Disclosure Statement or Certificate relating to Cost Accounting Standards when such data are required by other provisions of this contract to be obtained from the subcontractor.

d. The Contractor shall not enter into any subcontract for which advance notification to the Contracting Officer is required by this clause, without the prior written consent of the Contracting Officer: Provided that the Contracting Officer in his or her discretion, may ratify in writing any subcontract. Such ratification shall constitute the consent of the Contracting Officer required by this paragraph.

e. Neither consent by the Contracting Officer to any subcontract or any provisions thereof nor approval of the Contractor's procurement system shall be construed to be a determination of the acceptability of any subcontract price or of any amount paid under any subcontract or to relieve the Contractor of any responsibility for performing this contract, unless such approval or consent specifically provides otherwise.

f. The Contractor agrees that no subcontract placed under this contract shall provide for payment on a cost-plus-a-percentage-of-cost basis.

66. SAFETY AND HEALTH

The Contractor shall take all reasonable precautions in the performance of the work under this contract to protect the safety and health of employees and of members of the public and shall comply with all applicable safety

and health regulations and requirements (including reporting requirements) of DOE. The Contracting Officer shall notify, in writing, the Contractor of any noncompliance with the provisions of this clause and the corrective action to be taken. After receipt of such notice, the Contractor shall immediately take such corrective action. The Contractor shall submit a management program and implementation plan to the Contracting Officer for review and approval within 30 days after the date of award of this contract. In the event that the Contractor fails to comply with said regulations or requirements of DOE, the Contracting Officer may, without prejudice to any other legal or contractual rights of DOE, issue an order stopping all or any part of the work; thereafter, a start order for resumption of the work may be issued at the discretion of the Contracting Officer. The Contractor shall make no claim for an extension of time or for compensation or damages by reasons of, or in conjunction with, such work stoppage.

67. PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS

a. The Contractor will preserve all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not to be removed and which does not unreasonably interfere with the construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any limbs or branches of trees broken during such operations or by the careless operation of equipment, or by workers, shall be trimmed with a clean cut and painted with an approved tree-pruning compound as directed by the Contracting Officer.

b. The Contractor will protect from damage all existing improvements or utilities at or near the site of the work, the location of which is made known to it, and will repair or restore any damage to such facilities resulting from failure to comply with the requirements of this contract or the failure to exercise reasonable care in the performance of the work. If the Contractor fails or refuses to repair any such damage promptly, the Contracting Officer may have the necessary work performed and charge the cost thereof to the Contractor.

68. ENVIRONMENTAL LITIGATION

a. If the performance of all or any part of the work is suspended, delayed, or interrupted due to an order of a court of competent jurisdiction as a result of environmental litigation, as defined below, the Contracting Officer, at the request of the Contractor, shall determine whether the order is due in any part to the acts or omissions of the Contractor or a subcontractor at any tier not required by the terms of this contract. If it is determined that the order is not due in any part to acts or omissions of the Contractor or a subcontractor at any tier other than as required by the terms of this contract, such suspension, delay, or interruption shall be considered as if ordered by the Contracting Officer in the administration of this contract under the terms of the "Suspension of Work" clause of this contract. The period of such suspension, delay, or interruption shall be considered unreasonable, and an

adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) as provided in that clause, subject to all the provisions thereof.

b. The term "environmental litigation," as used herein, means a lawsuit alleging that the work will have an adverse effect on the environment or that the Government has not duly considered, either substantively or procedurally, the effect of the work on the environment.

69. VARIATIONS IN ESTIMATED QUANTITIES

(The following clause is not applicable to bid items listed in the "Variations in Estimated Quantities - Subdivided Items" clause.)

Where the quantity of a pay item in this contract is an estimated quantity and where the actual quantity of such pay item varies more than 15 percent above or below the estimated quantity stated in this contract, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contracting Officer shall, upon receipt of a written request for an extension of time within 10 days from the beginning of such delay, or within such further period of time which may be granted by the Contracting Officer prior to the date of final settlement of the contract, ascertain the facts and make such adjustment for extending the completion date as in his or her judgment the findings justify.

70. CONTRACT PRICES - BIDDING SCHEDULE

(The following clause is applicable to contracts containing unit prices.)

Payment for the various items listed in the Bidding Schedule shall constitute full compensation for furnishing all plant, labor, equipment, appliances, and materials, and for performing all operations required to complete the work in conformity with the drawings and specifications. All costs for work not specifically mentioned in the Bidding Schedule shall be included in the contract prices for the items listed.

71. PRIORITIES, ALLOCATIONS, AND ALLOTMENTS

The Contractor shall follow the provisions of DMS Regulation I and all other applicable regulations and orders of the Domestic and International Business Administration, Department of Commerce, in obtaining controlled materials and other products and materials needed to fill this order.

72. PROGRESS CHARTS AND REQUIREMENTS FOR OVERTIME WORK

a. The Contractor shall, within 5 days or within such time as determined by the Contracting Officer after date of commencement of work, prepare and submit to the Contracting Officer for approval a practicable schedule, showing the order in which the Contractor proposes to carry on the work, the date on which it will start the several salient features (including procurement of materials, plant, and equipment), and the contemplated

dates for completing the same. The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion at any time. The Contractor shall enter on the chart the actual progress at such intervals as directed by the Contracting Officer, and shall immediately deliver to the Contracting Officer three copies thereof. If the Contractor fails to submit a progress schedule within the time herein prescribed, the Contracting Officer may withhold approval of progress payment estimates until such time as the Contractor submits the required progress schedule.

b. If, in the opinion of the Contracting Officer, the Contractor falls behind the progress schedule, the Contractor shall take such steps as may be necessary to improve this progress; and the Contracting Officer may require it to increase the number of shifts, or overtime operations, days of work, or the amount of construction plant, or all of them, and to submit for approval such supplementary schedule or schedules in chart form as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the Government.

c. Failure of the Contractor to comply with the requirements of the Contracting Officer under this provision shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will ensure completion within the time specified. Upon such determination the Contracting Officer may terminate the Contractor's right to proceed with the work or any separable part thereof, in accordance with the clause of the contract entitled "Termination for Default - Damages for Delay - Time Extensions."

73.1 GOVERNMENT-FURNISHED PROPERTY (Short Form)

(The following clause is applicable when Government property having an acquisition cost of $25,000 or less is furnished to or acquired by the Contractor.)

a. The Government shall deliver to the Contractor, for use only in connection with this contract, the property described in the schedule or specifications (hereinafter referred to as "Government-furnished property"), at the times and locations stated therein. If the Government-furnished property, suitable for its intended use, is not so delivered to the Contractor, the Contracting Officer shall, upon timely written request made by the Contractor, and if the facts warrant such action, equitably adjust any affected provision of this contract pursuant to the procedures of the "Changes" clause hereof.

b. Title to Government-furnished property shall remain in the Government. The Contractor shall maintain adequate property control records of Government-furnished property in accordance with sound industrial practice.

c. Unless otherwise provided in this contract, the Contractor, upon delivery to it of any Government-furnished property, assumes the risk of, and shall be responsible for, any loss thereof or damage thereto except for reasonable wear and tear, and except to the extent that such property is consumed in the performance of this contract.

d. The Contractor shall, upon completion of this contract, prepare for shipment, deliver f.o.b. origin, or dispose of all Government-furnished property not consumed in the performance of this contract or not theretofore delivered to the Government, as may be directed or authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or paid in such other manner as the Contracting Officer may direct.

73.2 GOVERNMENT PROPERTY (Fixed Price)

a. The Government shall deliver to the Contractor, for use in connection with and under the terms of this contract, the property described as Government-furnished property in the Schedule or specifications, together with such related data and information as the Contractor may request and as may reasonably be required for the intended use of such property (hereinafter referred to as "Government-furnished property"). The delivery or performance dates for the supplies or services to be furnished by the Contractor under this contract are based upon the expectation that Government-furnished property suitable for use (except for such property furnished "as is") will be delivered to the Contractor at the times stated in the Schedule or, if not so stated, in sufficient time to enable the Contractor to meet such delivery or performance dates. In the event that Government-furnished property is not delivered to the Contractor by such time or times, the Contracting Officer shall, upon timely written request made by the Contractor, make a determination of the delay, if any, occasioned the Contractor thereby, and shall equitably adjust the delivery or performance dates or the contract price, or both, and any other contractual provision affected by any such delay, in accordance with the procedures provided for in the clause of this contract entitled "Changes." Except for Government-furnished property furnished "as is," in the event the Government-furnished property is received by the Contractor in a condition not suitable for the intended use the Contractor shall, upon receipt thereof, notify the Contracting Officer of such fact and, as directed by the Contracting Officer, either (1) return such property at the Government's expense or otherwise dispose of the property, or (2) effect repairs or modifications, in accordance with the procedures provided for in the clause of this contract entitled "Changes." The foregoing provisions for adjustment are exclusive and the Government shall not be liable to suit for breach of contract by reason of any delay in delivery of Government-furnished property or delivery of such property in a condition not suitable for its intended use.

b. (1) By notice in writing, the Contracting Officer may (a) decrease the property provided or to be provided by the Government under this contract, or (b) substitute other Government-owned property for property to be provided by the Government, or to be acquired by the Contractor for the Government, under this contract. The Contractor shall promptly take such action as the Contracting Officer may direct with respect to the removal and shipping of property covered by such notice.

(2) In the event of any decrease in or substitution of property pursuant to subparagraph (a) above, or any withdrawal of authority to use property provided under any other contract or lease, which property the Government had agreed in the Schedule to make available

for the performance of this contract, the Contracting Officer, upon the written request of the Contractor (or, if the substitution of property causes a decrease in the cost of performance, on its own initiative), shall equitably adjust such contractual provisions as may be effected by the decrease, substitution, or withdrawal, in accordance with the procedures provided for in the "Changes" clause of this contract.

c. Title to all property furnished by the Government shall remain in the Government. In order to define the obligations of the parties under this clause, title to each item of facilities, special test equipment, and special tooling (other than that subject to a "Special Tooling" clause) acquired by the Contractor for the Government pursuant to this contract shall pass to and vest in the Government when its use in the performance of this contract commences, or upon payment therefor by the Government, whichever is earlier, whether or not title previously vested. All Government-furnished property, together with all property acquired by the Contractor title to which vests in the Government under this paragraph, is subject to the provisions of this clause and is hereinafter collectively referred to as "Government property." Title to Government property shall not be affected by the incorporation or attachment thereof to any property not owned by the Government, nor shall such Government property, or any part thereof, be or become a fixture or lose its identity as personality by reason of affixation to any realty.

d. The Contractor shall be responsible for and accountable for all Government property provided under this contract. The Contractor shall establish and maintain a system to control, protect, preserve, and maintain all Government property in accordance with applicable provisions of the DOE Property Management Regulations (DOE-PMR) 41 CFR 109-60 as in effect on the date of the contract. The Contractor shall maintain and make available such records as are required by the approved system and must account for all property until relieved of responsibility therefor in accordance with written instructions of the Contracting Officer.

e. The Government property shall, unless otherwise provided herein or approved by the Contracting Officer, be used only for the performance of this contract.

f. The Contractor shall maintain and administer, in accordance with sound industrial practice and with applicable provisions of DOE-PMR 109.60, a program for the utilization, maintenance, repair, protection, and preservation of Government property so as to assure its full availability and usefulness for the performance of this contract. In the event that any damage occurs to Government property, the risk of which has been assumed by the Government under this contract, the Government shall replace such items or the Contractor shall make such repair of the property as the Government directs: Provided, however, That if the Contractor cannot effect such repair within the time required, the Contractor shall dispose of such property in the manner directed by the Contracting Officer. The contract price includes no compensation to the Contractor for the performance of any repair or replacement for which the Government is responsible, and an equitable adjustment will be made in any contractual provisions affected by such repair or replacement of Government property made at the direction of the Government, in accordance

with the procedures provided for in the "Changes" clause of this contract. Any repair or replacement for which the Contractor is responsible under the provisions of this contract shall be accomplished by the Contractor at its own expense.

g. Unless otherwise provided in this contract, the Contractor assumes the risk of, and shall be responsible for, any loss of or damage to Government property provided under this contract upon its delivery to it or upon passage of title thereto to the Government as provided in paragraph c. hereof, except for reasonable wear and tear and except to the extent that such property is consumed in the performance of this contract.

h. The Government, and any persons designated by it, shall at all reasonable times have access to the premise wherein any Government property is located, for the purpose of inspecting the Government property.

i. Upon the completion of this contract, or at such earlier dates as may be fixed by the Contracting Officer, the Contractor shall submit, in a form acceptable to the Contracting Officer, inventory schedules covering all items of Government property not consumed in the performance of this contract (including any resulting scrap) or not theretofore delivered to the Government, and shall prepare for shipment, delivery f.o.b. origin, or dispose of the Government property, as may be directed or authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or shall be paid in such other manner as the Contracting Officer may direct.

j. Unless otherwise provided herein, the Government:

(1) May abandon any Government property in place, and thereupon all obligations of the Government regarding such abandoned property shall cease; and

(2) Has no obligation to the Contractor with regard to restoration or rehabilitation of the Contractor's premises, neither in case of abandonment (paragraph j.(1) above), disposition on completion of need of the contract (paragraph (1) above), nor otherwise, except for restoration or rehabilitation costs which are properly included in an equitable adjustment under paragraph b. above.

k. All communications issued pursuant to this clause shall be in writing.

74. VALUE ENGINEERING INCENTIVE

(This clause is applicable for all contracts over $10,000.)

a. Intent and Objectives. This clause applies to any cost reduction proposal (hereinafter referred to as a Value Engineering Change Proposal or VECP) initiated and developed by the Contractor for the purpose of changing any requirement of this contract. This clause does not, however, apply to any such proposal unless it is identified by the Contractor, at the time of its submission to the Government as a proposal submitted pursuant to this clause.

(1) VECP's contemplated are those that would result in net savings to the Government by providing either: (a) a decrease in the cost of performance of this contract; or (b) a reduction in the cost of ownership (hereinafter referred to as collateral costs) of the work provided by this contract, regardless of acquisition costs. VECP's must result in savings without impairing any required functions and characteristics such as service life, reliability, economy of operation, ease of maintenance, standardized features, esthetics, fire protection features, and safety features presently required by this contract. However, nothing herein precludes the submittal of VECP's where the Contractor considers that the required functions and characteristics could be combined, reduced, or eliminated as being non-essential or excessive for the function served by the work involved.

(2) A VECP identical to one submitted under any other contract with the Contractor or another contractor may also be submitted under this contract.

(3) A proposal to decrease the cost of performing the contract solely or principally by substituting another subcontractor for one listed by the Contractor in its bid is not a VECP. In considering a VECP which, as an incident thereof, would entail substitution for a listed subcontractor, maintaining the objective of the subcontractor listing will be taken into account along with factors cited in paragraph (1) above.

b. Subcontractor Inclusion. The Contractor shall include the provisions of this clause, with a provision for sharing arrangements that meet or exceed the minimum percentage contained herein, in all first-tier subcontracts in excess of $25,000, and in any other subcontract which, in the judgment of the Contractor, is of such nature as to offer reasonable likelihood of value engineering cost reductions. At the option of the first-tier subcontractor, this clause may be included in lower tier subcontracts. The Contractor shall encourage submission of VECP's from subcontractors; however, it is not mandatory that VECP's be submitted nor is it mandatory that the Contractor accept and/or transmit to the Government VECP's proposed by its subcontractors.

c. Data Requirements. As a minimum, the following information shall be submitted by the Contractor with each VECP:

(1) A description of the difference between the existing contract requirement and the proposed change, and the comparative advantages and disadvantages of each, including justification where function or characteristic of a work item is being reduced.

(2) Separate detailed cost estimates for both the existing contract requirement and the proposed change, and an estimate of the change in contract price, including consideration of the costs of development and implementation of the VECP and the sharing arrangement set forth in this clause.

(3) An estimate of the effects the VECP would have on collateral costs to the Government, including an estimate of the sharing that the Contractor requests be paid by the Government upon approval of the VECP.

(4) Architectural, engineering, or other analysis in sufficient detail to identify and describe each requirement of the contract which must be changed if the VECP is accepted, with recommendation as to how to accomplish each such change and its effect on unchanged work.

(5) A statement of the time by which approval of the VECP must be issued by the Government to obtain the maximum cost reduction during the remainder of this contract, noting any effect on the contract completion time or delivery schedule.

(6) Identification of any previous submission of the VECP including the dates submitted, the agencies involved, the numbers of the Government contracts involved, and the previous actions by the Government, if known.

d. Processing Procedures. Six copies (or such other number of copies as may be specified by the Contracting Officer) of each VECP shall be submitted to the Contracting Officer, or his or her duly authorized representative. VECP's will be processed expeditiously; however, the Government will not be liable for any delay in acting upon a VECP submitted pursuant to this clause. The Contractor may withdraw, in whole or in part, any VECP at any time prior to acceptance by the Government. The Government shall not be liable for VECP development cost in the case where a VECP is rejected or withdrawn. The decision of the Contracting Officer as to the acceptance of a VECP under this contract shall be final and shall not be subject to the "Disputes" clause of this contract.

(1) The Contracting Officer may modify a VECP, with the concurrence of the Contractor, to make it acceptable. If any modification increases or decreases the savings resulting from the VECP, the Contractor's fair share will be determined on the basis of the VECP as modified.

(2) The Contracting Officer may accept, in whole or in part, a VECP submitted pursuant to this clause by giving the Contractor written notice thereof reciting acceptance under this clause. However, pending issuance of a formal change order or unless otherwise directed, the Contractor shall remain obligated to perform in accordance with the terms of the existing contract. Where the Contracting Officer has determined that a proposed change meets the submission requirements of this clause, he or she may accept the VECP and instruct the Contractor to proceed with the change even though an agreement has not been reached respecting cost savings and other results of the change.

(3) An approved VECP shall be finalized through an equitable adjustment in the contract price and time of performance by the issuance of a change order pursuant to the provisions of this clause bearing a notation so stating where an approved VECP also involves any other

applicable clause of this contract such as "Termination for Convenience of the Government," "Suspension of Work," "Changes," or "Differing Site Conditions," then that clause shall be cited in addition to this clause.

e. Computations for Change in Contract Cost of Performance. Separate estimates shall be prepared for both the existing contract requirement and the proposed change. Each estimate shall consist of an itemized breakdown of all costs of the Contractor and all subcontractors' work in sufficient detail to show unit quantities and costs of labor, material, and equipment.

(1) Contractor development and implementation costs for the VECP shall be included in the estimate for the proposed change. However, these costs will not be allowable if they are otherwise reimbursable as a direct charge under this contract.

(2) Government costs of processing or implementation of a VECP shall not be included in the estimates; however, such cost will be considered in the determination as to whether a net savings accrues to the Government (reference paragraph a.(1) above).

(3) If the difference in the estimates indicates a net reduction in contract price, no allowance will be made for overhead, profit, and bond. The resultant net reduction in contract cost of performance shall be shared in accordance with the provisions of paragraphs g.(1) or g.(2) of this clause, and the contract price shall be reduced by the Government's share of the savings.

(4) If the difference in the estimates indicates a net increase in contract price, the contract price shall be adjusted pursuant to the "Changes" clause of this contract, and the resulting contract modification shall also cite this clause, as provided by paragraph d.(3) above.

f. Computation for Collateral Costs. Separate estimates shall be prepared for collateral costs of both the existing contract requirement and the proposed change. Each estimate shall consist of an itemized breakdown of all costs and the basis for the data used in the estimate. Cost benefits to the Government include, but are not limited to, reduced costs of operation, maintenance, or receive repair, extended useful service life, increases in usable floor space, and reduction in the requirements for Government-furnished property. Increased collateral costs include the converse of such factors. Computation shall be as follows:

(1) Costs shall be calculated over a 20-year period on a uniform basis for each estimate and shall include Government costs of processing or implementing the VECP.

(2) If the difference in the estimates as approved by the Government indicates a savings, the Contractor shall divide the resultant amount by 20 to arrive at the average annual net collateral savings. The

resultant savings shall be shared in accordance with the provisions of paragraph g.(3) of this clause, and the contract price shall be increased by the Contractor's share of the savings.

(3) In the event that agreement cannot be reached on the amount of estimated collateral costs, the Contracting Officer shall determine the amount. His or her decision is final and is not subject to the provisions of the "Disputes" clause of this contract.

g. Sharing Arrangements. If a VECP is accepted by the Government, the Contractor is entitled to share in instant contract savings and collateral savings not as alternatives but rather to the full extent provided for in this clause. For the purposes of sharing under this clause, the term "instant contract" shall not include any changes to or other modifications of this contract, executed subsequent to acceptance of the particular VECP, by which the Government increases the quantity of any item of work or adds any item of work. It shall, however, include any extension of the instant contract through exercise of an option (if any) provided under this contract after acceptance of the VECP.

(1) When only the prime contractor is involved, it shall receive 50 percent and the Government 50 percent of the net reduction in the cost of performance of this contract.

(2) When a first-tier subcontractor is involved, it shall receive a minimum of 30 percent, the prime contractor a maximum of 30 percent, and the Government a fixed 40 percent of the net reduction in the cost of performance of this contract. Other subcontractors shall receive a portion of the first-tier subcontractor's savings in accordance with the terms of their contract with the first-tier subcontractors.

(3) When collateral savings occur the Contractor shall receive 20 percent of the average 1 year's net collateral savings. Subcontractor participation (to any tier) in such savings with the Contractor shall be as provided in the terms of the agreements of the contracting parties.

(4) The Contractor shall not receive instant savings or collateral savings shares on optional work listed in this contract until the Government exercises its option to obtain that work.

h. Data Restriction Rights. The Contractor may restrict the Government's right to use any sheet of a VECP, or of the supporting data, submitted pursuant to this clause, in accordance with the terms of the following legend if it is marked on each such sheet:

The data furnished pursuant to the Value Engineering Incentive Clause of contract...shall not be disclosed outside the Government, or duplicated, used, or disclosed in whole or in part, for any purpose other than to evaluate a VECP submitted under said clause. This restriction does not limit the Government's right to use information contained in this data if it is or has been obtained, or is otherwise available, from the Contractor or from another source, without limitations. If such a proposal is accepted by the Government under

said contract after the use of this data in such an evaluation, the Government shall have the right to duplicate, use, and disclose any data reasonably necessary to the full utilization of such proposal as accepted, in any manner and for any purpose whatsoever, and have others so do.

In the event of acceptance of a VECP, the Contractor hereby grants to the Government all rights to use, duplicate, or disclose, in whole or in part, in any manner and for any purpose whatsoever, and to have or to permit others to do so, data reasonably necessary to fully utilize such proposal on this and any other Government contract.

Authority: Section 161 of the Atomic Energy Act of 1954, as amended, 68 Stat. 948, 42 U.S.C. 2201; Section 205 of the Federal Property and Administrative Services Act of 1949, as amended, 63 Stat. 390.40 U.S.C. 486.

75. UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL BUSINESS CONCERNS OWNED AND CONTROLLED BY SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS

(a) It is the policy of the United States that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals shall have the maximum practicable opportunity to participate in the performance of contracts let by any Federal agency.

(b) The contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with the efficient performance of this contract. The contractor further agrees to cooperate in any studies or surveys as may be conducted by the Small Business Administration or the contracting agency which may be necessary to determine the extent of the contractor's compliance with this clause.

(c) (1) As used in this contract, the term "small business concern" shall mean a small business as defined pursuant to section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

(2) The term "small business concern owned and controlled by socially and economically disadvantaged individuals" shall mean a small business concern-

(i) which is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or in the case of any publicly owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(ii) whose management and daily business operations are controlled by one or more of such individuals.

The contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans,

Asian-Pacific Americans, and other minorities, or any other individual found to be disadvantaged by the Small Business Administration pursuant to section 8(a) of the Small Business Act.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.

76. SUBCONTRACTING PLAN FOR SMALL BUSINESS CONCERNS AND SMALL BUSINESS CONCERNS OWNED AND CONTROLLED BY SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS

a. The Contractor agrees to comply in good faith with the small and small disadvantaged business concerns subcontracting plan which is hereby incorporated in and made a part of this contract. In this connection, the Contractor shall:

(1) Use its best effort to attain such percentage goals as may be set forth in the plan;

(2) Designate an individual who will: (a) maintain liaison with the Government on matters relating to small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals, (b) monitor compliance with the clause entitled "Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals," and (c) administer the Contractor's plan.

(3) Provide adequate and timely consideration of the potentialities of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals in all "make-or-buy" decisions.

(4) Assure that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals will, consistent with efficient performance of the contract, have the maximum practicable opportunity to compete for subcontracts, particularly by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation of such concerns. Where the Contractor's list of potential subcontractors which are small business and small business concerns owned and controlled by socially and economically disadvantaged individuals are excessively long, reasonable effort shall be made to give all such concerns an opportunity to compete over a period of time.

(5) Maintain records showing: (a) whether each subcontractor is a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals, and (b) procedures which have been adopted to comply with the plan and the policies set forth in this clause.

(6) Notify the Contracting Officer before soliciting bids, quotations, or proposals on any subcontract (including purchase orders) in excess of $10,000 if (a) no small business concern or small business concern owned and controlled by socially and economically disadvantaged individuals is to be solicited, and (b) the Contracting Officer's consent to the subcontract is required by a "Subcontracts" clause in this contract. Such notification will state the Contractor's reasons for nonsolicitation of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals and will be given as early in the procurement cycle as possible so that the Contracting Officer may suggest potentially qualified small business concerns or small business concerns owned and controlled by socially and economically disadvantaged individuals. In no case will the procurement action be held up when to do so would, in the Contractor's judgment, delay performance under the contract and the Contractor's notification shall specify that it is proceeding with the solicitation.

(7) Include the "Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals" clause in all subcontracts over $10,000 which offer further subcontracting opportunities.

(8) Cooperate in any studies or surveys of the Contractor's subcontracting procedures and practices as may be required by the Department of Energy or the Small Business Administration.

(9) Submit quarterly reports of subcontracting to small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals on such forms as may be specified elsewhere in this contract.

b. The Contractor agrees that failure to comply in good faith with the clause entitled "Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals," or the terms of the subcontracting plan incorporated into the contract will be a material breach of the contract and the contract may be terminated, in whole or in part, for default.

c. The Contractor further agrees to insert in all subcontracts hereunder (except those with small business concerns) which contain the clause entitled "Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals" which offer further subcontracting opportunities and which may exceed $1 million in the case of a subcontract for the construction of any public facility or excess of $500,000 in the case of all other subcontracts provisions which shall conform substantially to the language of this clause, including this paragraph c., and to notify the Contracting Officer of the names of such subcontractors.

d. The provisions of this clause shall not apply to small business concerns.

77. UTILIZATION OF WOMEN-OWNED BUSINESS CONCERNS

a. It is the policy of the United States Government that women-owned businesses shall have the maximum practicable opportunity to participate in the performance of contracts awarded by any Federal agency.

b. The Contractor agrees to use its best efforts to carry out this policy in the award of subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, a "woman-owned business" concern means a business that is at least 51 percent owned by a woman or women who also control and operate it. "Control" in this context means being actively involved in the day-to-day management. "Women" means all women business owners.

78. WOMEN-OWNED BUSINESS CONCERNS SUBCONTRACTING PROGRAM

a. The Contractor agrees to establish and conduct a program which will enable women-owned business concerns to be considered fairly as subcontractors and suppliers under this contract. In this connection, the Contractor shall:

(1) Designate a liaison officer who will administer the Contractor's "Women-Owned Business Concerns Program."

(2) Provide adequate and timely consideration of the potentialities of known women-owned business concerns in all "make-or-buy" decisions.

(3) Develop a list of qualified bidders that are women-owned businesses and assure that known women-owned business concerns have an equitable opportunity to compete for subcontracts, particularly by making information on forthcoming opportunities available, by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation of women-owned business concerns.

(4) Maintain records showing (a) procedures which have been adopted to comply with the policies set forth in this clause, including the establishment of a source list of women-owned business concerns; (b) awards to women-owned businesses on the source list by minority and nonminority women-owned business concerns; and (c) specific efforts to identify and award contracts to women-owned business concerns.

(5) Include the "Utilization of Women-Owned Business Concerns" clause in the subcontracts which offer substantial subcontracting opportunities.

(6) Cooperate in any studies and surveys of the Contractor's women-owned business concerns procedures and practices that the Contracting Officer may from time to time conduct.

(7) Submit periodic reports of subcontracting to women-owned business concerns with respect to the records referred to in subparagraph (4) above, in such form and manner and at such time (not more often than quarterly) as the Contracting Officer may prescribe.

b. The Contractor further agrees to insert, in any subcontract hereunder which may exceed $500,000, or $1 million in the case of contracts for the construction of any public facility and which offers substantial subcontracting possibilities, provisions which shall conform substantially to the language of this clause, including this paragraph b., and to notify the Contracting Officer of the names of such subcontractors.

c. The Contractor further agrees to require written certification by its subcontractors that they are bona fide women-owned and -controlled business concerns in accordance with the definition of a women-owned business concern as set forth in the "Utilization of Women-Owned Business Concerns" clause at the time of submission of bids or proposals.

79. PAYMENT TERMS AND PENALTIES

a. Notwithstanding the payment provision stated elsewhere in this contract, payment due dates for accepted work under this contract shall be determined as provided herein.

b. Payments for supplies, services or work accepted under this contract shall be due on the later of 30 calendar days after receipt of a proper invoice and release(s) of all claims by the Government office designated in this contract for invoice receipt, or 30 calendar days after Government acceptance of the supplies, services or work.

c. Invoices shall include the Contractor's name and invoice date; contract or order number; description, price and quantity of item(s) actually delivered or services rendered; shipping and payment terms; other documentation or information as required by the contract; and name (where practicable), title, phone number, office name and complete mailing address of responsible official to whom payment is to be sent.

d. For purposes of determining payment due dates under this contract the Government agrees to inspect and determine the acceptability of items delivered under the terms of this contract within 5 calendar days after receipt or completion of work.

e. The Government shall pay an interest penalty when the payment check or wire transfer is dated more than 15 calendar days after the payment due date as established by the provisions herein; or a discount is taken after expiration of the discount period and the underpayment is not corrected within 15 calendar days of the expired discount period.

f. Interest penalties due under the provisions of this clause shall be calculated in accordance with the provisions of the Prompt Payment Act (P.L. 97-177); based on the interest rate(s) established by the Secretary of Treasury under Section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611). Claims for failure to pay interest penalties may be filed under the Contract Disputes Act of 1978 (41 U.S.C. 601 et seq.). Interest penalties under this clause shall not accrue for more than one year or after the timely filing of a claim for such penalties under the Contract Disputes Act.

g. Claims concerning disputes, and any interest which may be payable with respect to the period while such dispute is being resolved, shall be subject to the provisions specified in the disputes clause of this contract.

h. Interest penalties shall not apply when the contractor is notified that an invoice is defective or improper provided the Contractor is notified within 15 calendar days after invoice receipt; payment is delayed because of a disagreement between the Government and the Contractor concerning contract compliance or amounts invoiced; or the penalty amounts to less than one dollar; nor are they required when payments are made solely for financing purposes, payments are made in advance, or for a period when amounts are withheld temporarily in accordance with the contract. In the event the Government fails to provide notification of a defective invoice within 15 calendar days, the due date for the corrected invoice will be the normal payment due date less the difference between the 15th calendar day and the day notification was made.

SECTION M

LIST OF DOCUMENT EXHIBITS AND OTHER ATTACHMENTS

M-1. This solicitation consists of the following:

Part I - General Instructions, Sections A, B, C, and D

Part II - The Schedule, Sections E, F, G, H, I, J, and K

Part III - General provisions, Section L

Part IV - List of Documents, Exhibits, and Other Attachments, Section M

Specification No. WC-4-15857-116

Drawings in accordance with subparagraph 4.1.2 of the specifications

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1.1--GENERAL CONDITIONS

1.1.1 THE REQUIREMENT:

It is required that there be constructed and completed, in accordance with the Construction Contract (Standard Form 23), including the General Provisions, these specifications, and the drawings listed in the "List of Drawings" paragraph hereof, the Fort Peck-Havre 230-kV Transmission Line in Montana for the Western Area Power Administration, Department of Energy.

The work is situated in Hill, Blaine, Phillips, Valley, and McCone Counties, Montana. The transmission line is located as shown on drawings 1 (FP-HV 0024), 2 (FP-HV 0025), 3 (FP-HV 0026), 4 (FP-HV 0027), 5 (FP-HV 0028), 6 (FP-HV 0029), and 7 (FP-HV 0030).

1.1.2 DESCRIPTION OF WORK:

a. GENERAL: The transmission line to be constructed under these specifications will be a 230-kilovolt, 3-phase, 60-hertz, single-circuit, wood pole H-frame line approximately 180 miles in length. The line will have three 954,000-circular mil, ACSR, 45/7 conductors and two 3/8-inch diameter, high strength steel, 7-strand overhead ground wires.

b. LOADING CONDITIONS: The transmission line to be constructed is designed for heavy loading conditions in accordance with the National Electrical Safety Code. Unless otherwise indicated on the plan and profile drawings, all construction and clearances of the transmission line shall conform to the 1981 Edition of the National Electrical Safety Code, ANSI C 2.

c. WORK TO BE PERFORMED: The principle components of work to be performed under these specifications include the following:

(1) Complete removal of about 188 miles of existing Fort Peck-Havre 161-kV Transmission Line.

(2) Furnishing and installing wood pole structures.

(3) Furnishing and installing conductor insulator assemblies.

(4) Furnishing and stringing three 954,000-circular mil, ACSR, 45/7 nonspecular conductors.

(5) Furnishing and installing overhead ground wire assemblies.

(6) Furnishing and stringing two 3/8-inch-diameter, high strength steel, 7-wire overhead ground wire.

(7) Furnishing and installing gates in right-of-way fences.

(8) Furnishing and installing conductor weights.

(9) Furnishing and installing vibration dampers.

(10) Furnishing and attaching structure signs.

(11) Furnishing and installing all materials to complete the various approach spans.

d. EXISTING ENERGIZED TRANSMISSION LINES: At least ninety-five miles of the transmission line will closely parallel existing energized transmission lines. During stringing operations a build-up of voltage due to energized parallel facilities may result in safety hazards. The contractor shall be responsible for familiarizing himself with the area and shall implement parallel stringing procedures as specified in the "Safety and Health Requirements" Section when stringing conductors adjacent to energized facilities, including those located within the areas listed below.

The item of the Schedule entitled "Additional work and materials required for stringing adjacent to existing energized transmission lines" includes only the additional labor, materials, and equipment required due to the new transmission line closely paralleling existing energized transmission lines. Furnishing all materials and performing all work for stringing the nonspecular conductors and overhead ground wires, including that portion of the new line paralleling other energized lines, are provided for in the "Electrical" Division and included in the applicable items of the Schedule.

Hazardous sections denoted by beginning and ending structure numbers:

TABLE 1-1

BEGIN STRUCTURES	PLAN & PROFILE	END STRUCTURE	PLAN & PROFILE
FORT PECK	4000	6/1	4006
17/1	4017	20/1	4020
28/3	4028	30/3	4030
44/4	4044	46/7	4046
48/6	4048	49/7	4049
75/2	4074	115/4	4114
122/5	4120	143/8	4141
157/2	4154	HAVRE SUB	4175

Any other sections of the transmission line not separated from the above listed sections by a dead end structure is also hazardous. At the contractor's option and expense, dead end structures may be installed at the above listed structure locations to reduce the length of transmission line strung under parallel conditions.

1.1.3 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK:

a. COMPLETION PERIOD: The contractor shall begin work within 30 calendar days after date of receipt of notice to proceed, and shall complete construction of the new transmission line by December 1, 1985, and removal of the existing transmission line by April 1 1986. The period allowed for the completion of the work shall be reduced by one calendar day for each calendar day in excess of 10 calendar days, or any extension thereof, elapsing between the contractor's receipt of and return of properly executed contract, and performance and payment bonds as required in the Bid Form (Standard Form 21).

For notice to proceed purposes the contract is divided into three parts as follows:

PART A: Notice to Proceed will be issued as soon as practicable after award of the contract for preparatory work including planning, organizing, scheduling, and procurement of materials.

PART B: Notice to Proceed will be issued on or before May 1, 1984, for on-site work from Havre to Malta.

PART C: Notice to Proceed will be issued on or before August 1, 1984, for on-site work from Malta to Ft. Peck.

Except as otherwise provided in these specifications for specific submittals, Western will require 40 calendar days for review of drawings or data submitted by the contractor for approval and this review time will apply to each separate submittal or resubmittal whether the drawings or data are approved, not approved, or returned for revision. If Western uses time in excess of the above-stated number of days for review of any submittal or resubmittal, the excess time will be added to the time allowed the contractor for completion of the work affected by such excess time; except, if the review of two or more separate submittals or resubmittals is late and results in concurrent days of excess time, such days will be counted only once in computing an extension of the completion date. The number of calendar days required for review of drawings or data submitted or resubmitted for approval will include the date the drawings or data are received by Western and will extend through the date of return mailing to the contractor.

b. PROSECUTION OF THE WORK: The capacity of the contractor's construction plant, sequence of operations, method of operation, and the forces employed shall, at all times during the continuance of the contract, be subject to the approval of the Authorized Representative and shall be such as to insure the completion of the work within the specified period of time.

c. PRIORITIES: If performance under these specifications is delayed by operations of any United States national priorities or material allocation system, the time for performance will be extended to compensate for such delays.

d. OUTAGES: The majority of the new transmission line can be constructed without outages. Work shall be performed in such a manner as to continue serving customer loads from Harlem, Malta, and Richardson Coulee Substations.

For the purpose of these specifications, a segment will be defined as the portion of transmission line between Havre and Harlem, Harlem and Malta, Malta and the new Richardson Coulee Substation, and the new Richardson Coulee Substation to Fort Peck Switchyard. More than one segment may be under construction at the same time, limited only by the right-of-way made available by Western. Whole segments shall be complete before outages may be taken to interconnect with a substation. The most westerly transmission line segments shall be completed and energized first.

Line segments between any two substations may be taken completely out of service between April 1 to July 15, and September 15 to November 15. During other time periods of the year, short outages will be allowed to make the interconnection between the new transmission line and the substations.

An extended outage will be allowed for construction of the segment between the new Richardson Coulee Substation and Fort Peck Switchyard since the new line will be constructed on about 4 1/2 miles of the same right-of-way presently utilized by the old line. The outage will be limited to 30 days and shall be scheduled between April 1 to July 15 or September 15 to November 15.

Montana Power Company plans on energizing the existing 161-kV Transmission Line from Malta Substation to the existing Richardson Coulee Substation at 69-kV to continue serving customer loads while they are moving equipment from the existing substation to the new Richardson Coulee Substation. It is estimated that the time period involved will be from September 15, 1985, to October 15, 1985. Therefore, removal of the existing 161-kV Transmission Line between Malta and the existing Richardson Coulee Substation cannot commence until after October 15, 1985.

e. GROUSE LEKS: The transmission line either crosses or is close to a number of Grouse Leks. Grouse Leks are areas where male Sage Grouse or Sharptail Grouse congregate in early spring to perform the courtship displays. No construction activities will be allowed from April 1 through May 31 within one-quarter mile of the designated areas unless clearance is received from the Authorized Representative. There are nine locations where Grouse Leks are known to exist which may be impacted by transmission line construction activities. Approximate location according to station number is:

TABLE 1-2

STATION	SPECIES
4097	Sharptailed Grouse
3890	Sharptailed Grouse
3152	Sharptailed Grouse
2790	Sharptailed Grouse
2475	Sharptailed Grouse
1950	Sage Grouse
1889	Sage Grouse
1190	Sage Grouse
560	Sage Grouse

1.1.4 CONSTRUCTION PROGRAM:

a. GENERAL: Pursuant to the General Provisions clause entitled "Progress Charts and Requirement for Overtime Work", the contractor shall submit to the Authorized Representative for approval a complete and practicable construction program. Instead of the time allowed in the General Provisions, the contractor shall submit the construction program within 45 calendar days after the date of the notice to proceed. The construction program shall show in detail his proposed program of operations and shall provide for orderly performance of the work. Pending approval of his program, the contractor shall proceed with the work in accordance with these specifications and his proposed construction program.

The construction program shall be in suitable form and show the percentage of work for each line item scheduled for completion each month, and shall include the contractor's estimate of earnings by months. Western's approval of the contractor's program shall not obligate Western to provide funds in any manner other than as provided for in the General Provisions clause entitled "Payments to Contractor".

b. FORMAT AND DETAIL: The construction program shall be in such form and detail as to show the following:

(1) Sequence of operations.

(2) The dates for commencing and completing the work on the several controlling features of the project, including erection of construction plant and each item or group of like items involving placement of concrete, if applicable.

(3) The dates of issuance of orders for procurement of contractor-furnished materials and equipment and their delivery and installation dates.

(4) The dates on which each item of Western-furnished equipment will be required. If estimated dates are shown elsewhere in these specifications for delivery, the date stated in the construction program shall in no case be earlier than such date.

(5) The leadtimes required, for any Western-furnished construction drawings for each feature detailed by the contractor in subparagraph (1) above. Leadtimes greater than 75 days shall be justified.

(6) The dates on which contractor-prepared drawings will be submitted for approval, including all shop drawings as required in these specifications.

(7) The dates and length of time of any required power outages.

c. ALTERNATE CPM FORMAT: If the contractor elects to program the work by the CPM (Critical Path Method) or by a similar type of network analysis system, he shall submit such program and revised programs as required in lieu of the program specified above. Such CPM program shall include all information required above. The contractor shall submit translucent reproducibles of the network diagram and of printout or computation sheets for such construction program. Reproducibles shall be of such quality as to permit clear, sharp, legible prints to be made by direct-contact methods. If requested, the contractor shall also furnish a printout of the computer data.

d. SUBMITTAL REQUIREMENTS:

(1) General: Timely submittal of the construction program and timely revisions thereto are important. Western must have the information contained in the construction program for such purposes as scheduling the preparation of additional drawings required for construction delivery of Western-furnished materials and equipment, and scheduling services of inspectors.

(2) Form of Submittal: An original or translucent reproducible and three blackline prints of each construction program and each revised program shall be submitted. Originals or reproducibles shall be of such quality as to permit clear, sharp, legible prints to be made by direct-contact methods.

(3) Revisions: The contractor shall revise the construction program as necessary to keep it current and shall enter on the program the actual progress at the end of each progress payment period or at such other intervals as directed by Western, and shall submit two such marked prints of the program to Western.

(4) Late Submittals: The contractor will be assessed liquidated damages as specified in the Special Provisions, Section J, for late submittal of the construction program. Further, should the Contracting Officer notify the contractor in writing that a revision of the construction program is required, liquidated damages will be assessed for each calendar day beyond 30 calendar days, after receipt of such notification, that the contractor fails to submit the required revision.

1.1.5 STAKING OUT WORK:

a. GENERAL: Western has located the center of each transmission structure on the transmission line centerline. The center of each structure site is marked with a 1/2-inch rebar and lath. In grassland, the rebar is flush with the ground and in cropland the rebar is buried 12-14 inches below ground surface. Western will only provide survey crew services to reestablish transmission line points of intersection. The contractor shall be responsible for reestablishing all structure sites and for staking of all auger points for poles and guys.

b. CONTRACTOR'S SURVEY WORK: All survey work for control performed by the contractor shall be of sufficient accuracy to assure the centerline point of each structure site is within 0.2 foot of the true tangent line between points of intersection and within plus or minus 1.0 foot of the correct centerline station. All guys shall be located with an accuracy of plus or minus 1.0 foot. The above accuracies shall be as measured from basic control furnished by Western. Conditions encountered during construction that are different than those represented on the drawings shall be accurately noted and furnished to Western for "as-builts". The contractor shall maintain and preserve all stakes and other marks established by him or by Western until their removal is authorized by the Authorized Representative.

(1) Access Roads: The contractor shall stake and mark all Western provided access roads rights-of-way in accordance with the legal descriptions and plats to be furnished by Western.

c. SURVEY EQUIPMENT AND PERSONNEL: The contractor shall provide all labor and materials including stakes, spikes, steel pins, templates, survey equipment, tools, transportation, materials, and field books, required to perform the prescribed surveys. All contractor survey work shall be under the supervision of a surveyor or engineer whose qualifications shall be subject to the approval of Western. All survey stakes pins, spikes, and other material shall be removed from within the top 15 inches of the topsoil as a part of the contractor's final cleanup.

1.1.6 DEFINITIONS:

In addition to the terms covered in the General Provisions Clauses entitled "Definitions" and "Additional Definitions", the terms and definitions listed below also apply to these specifications.

"Western" as used herein means the Western Area Power Administration and/or its agents.

"Authorized Representative" as used herein means the person duly appointed as the Contracting Officer's Technical Representative.

"Material" or "materials" as used herein to denote items furnished by the contractor or by Western means machinery, components, products or any other item incorporated in the work.

"Paragraph" as used herein denotes the entire number of subparagraphs under the referenced numerical designation. For example, if the title of paragraph 1.1.5 is referenced, all subparagraphs a., b., c., etc., or all subparagraphs if not designated by letter or number are included under this reference. Also, where statements such as "all work described in this paragraph" are used, paragraph means the entire numerical designation (i.e., 1.1.5, 2.2.3, etc.) including all subparagraphs under that designation. When only a portion of the paragraph applies, the reference is made to the paragraph by title and to the applicable portion by referencing the subparagraph (i.e., subparagraph a. of "Description of Work" paragraph, etc.). If reference is made to a subparagraph within the same paragraph, only the subparagraph designation is used (i.e., d. below, (3) above, etc.).

SECTION 1.2--MATERIALS

1.2.1 MATERIALS FURNISHED BY WESTERN:

Western will provide gate closers for the barbed-wire gates. The gate closers will be delivered to the contractor at the jobsite after notice to proceed has been issued. The contractor shall replace any gate closer lost or damaged after receipt from Western. The cost of hauling, storing, and installing the Western-furnished gate closers shall be included in the price per gate bid therefor in the Schedule.

1.2.2 MATERIALS FURNISHED BY THE CONTRACTOR:

a. GENERAL: The contractor shall furnish all materials required for completion of the work, except materials furnished by Western listed in the "Materials Furnished by Western" paragraph. Refer to the General Provisions clause entitled "Material and Workmanship" for additional materials requirements.

b. SUBSTITUTION OF MATERIALS: The contractor shall make diligent effort to procure the type and grade of materials specified from any and all sources, but where because of Western's priorities or other causes, materials required by the specifications become unavailable, approved substitute materials may be used. Substitute materials shall not be used without prior written approval by Western. The written approval will state the amount of the adjustment, if any, to be made in favor of Western. Western's determination as to whether substitution will be permitted and as to what substitute materials may be used shall be final and conclusive. If the substitute materials approved are of less value to Western or involve less cost to the contractor than the materials specified, an adjustment shall be made in favor of Western, and where the amount involved or the importance of the substitution warrants, an order for changes will be issued, otherwise the adjustment will be handled by deduction from payments to the contractor on the basis of prices stated in the written approval.

c. INSPECTION OF MATERIALS: Materials furnished by the contractor shall be subject to inspection in accordance with the General Provisions clause entitled "Inspection and Acceptance" and the Special Provisions clause entitled "Government Inspection of Materials".

1.2.3 REFERENCE SPECIFICATIONS AND STANDARDS:

a. GENERAL: In addition to the requirements of the General Provisions clause entitled "Material and Workmanship", all materials that will become a part of the completed work shall conform to the Federal or other specifications and standards referred to herein. Where reference specifications numbers are designated throughout these specifications, they refer to Federal Specifications unless otherwise noted. The materials to be furnished by the contractor which are specified by reference to Federal Specifications, Federal Standards, or other standard specifications or codes shall be in compliance with the latest editions or revisions thereof in effect on the date bids are received, including any amendments or supplements. In the event of conflicting requirements between a referenced specification, standard, or code, and these specifications, these specifications shall govern. In the event that the materials are not covered by Federal or other specifications, the materials furnished shall be of standard commercial quality. Where types, grades, or other options offered in the reference specifications are not specified in these specifications, the material furnished will be acceptable if it is in accordance with any one of the types, grades, or options offered.

Copies of the Federal Specifications may be examined at Western, 1627 Cole Blvd., Golden, CO 80401.

Single copies of Federal Specifications may be obtained without charge at Business Service Centers of Regional Offices of the General Services Administration. Specifications, standards, and codes published by associations or other standardizing agencies should be obtained by the contractor, at his expense, directly from those agencies.

b. ADDRESSES FOR OBTAINING REFERENCE SPECIFICATIONS AND STANDARDS: Addresses for obtaining some of the referenced specifications, standards, and codes are listed below. Information on other specifications, standards, and codes referred to in these specifications may be obtained from Western, P.O. Box 3402, Golden, CO 80401, Attention: Code A2600.

Federal Specifications and Standards-Specifications Activity, Building 197, Washington Navy Yard, General Services Administration, Washington, DC 20407

Military Specifications and Standards-Naval Publications and Forms Center, 5801 Tabor Avenue, Philadephia, PA 19120

ANSI-American National Standards Institute, 1430 Broadway, New York, NY 10018

ASTM-American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103

AWS-American Welding Society, Inc., 2501 NW. Seventh Street, Miami, FL 33125

IEEE-Institute of Electrical and Electronic Engineers, 345 East 47th Street, New York, NY 10017

ICEA-Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664

NEC-National Electrical Code, National Fire Protection Association, Battery March Park, Quincy, MA 02269

NEMA-National Electrical Manufacturers Association, 2101 L Street N.W., Suite 300, Washington, DC 20037

SECTION 1.3--LOCAL CONDITIONS

1.3.1 RIGHTS-OF-WAY:

Western will provide the right-of-way for the transmission line and right-of-way for access thereto over routes established by Western. The contractor is cautioned that various wooden bridges across irrigation canals may not support heavy construction vehicles and/or loads. The contractor should visit the area prior to bidding to determine allowable loads.

The transmission line right-of-way is 150 feet wide, except at locations where guys and anchors require additional right-of-way. Western has acquired access easements from existing public roads to the transmission line and a considerable amount of off right-of-way access along the transmission line. This off right-of-way access route is to provide access along the transmission line to structure sites not accessible by traveling the transmission line. Western does not represent that the contractor can gain access to every structure site or travel continuously along the transmission line. The contractor shall either orient his construction methods and equipment to utilize Western-furnished rights-of-way or obtain additional temporary access at his own expense. Any additional temporary access acquired by the contractor must have prior approval by Western since several areas of the transmission line do have travel restricted areas. During the period of the contract, Western reserves the right to use any contractor-obtained access.

The contractor must contact the manager of the Ft. Assinnibone and Agricultural Research Center prior to any entry on the Center's lands.

1.3.2 ACCESS TO THE WORK AND HAUL ROUTES:

a. GENERAL: Rights-of-way for access to the work from existing roads will be provided by Western as specified hereinbefore. All work on the rights-of-way necessary for access to or along the transmission line shall be performed by the contractor. Only that excavation, dozing, or blading that is absolutely necessary will be allowed. Any excavation, dozing or blading for ease of travel may only be performed after field review and approval by the Authorized Representative. Any unauthorized

excavation, dozing, or blading performed by the contractor shall immediately be repaired or Western will cause the damage to be repaired and back charge the contractor for all costs involved.

All excavation, dozing, or blading done for ease of travel on any easement or for crane landings shall be restored to the original contour of the land and shall be compacted to a dry density not less than the natural in-place dry density of the surrounding earth. The use of water may be required to obtain the required density. Topsoil shall be stockpiled and spread on cuts prior to completion of work under these specifications.

The contractor shall make his own investigation of the condition of available public or private roads and of clearances, restrictions, bridge-load limits, bond requirements, and other limitations that affect or may affect transportation and ingress and egress at the jobsites. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of work. The contractor shall construct and maintain any haul roads, access roads, bridges, or drainage structures required for construction operations.

b. EXISTING ROADS: Existing roads are available for the contractor's use subject to existing restrictions. The contractor shall meet all conditions properly imposed upon the use of existing roads by those having jurisdiction thereover, including (without limitation of the generality of the foregoing) seasonal or other limitations or restrictions, the payment of excess size and weight fees, and the posting of bonds conditioned upon repair of road damage caused by the contractor.

c. HAUL ROUTES: The hauling of wood poles, earth materials, or other intrajob hauling, over public highways, roads, or bridges shall be in compliance with the applicable local regulations and shall be such as to minimize interference with or congestion of local traffic. Where haul routes cross public highways or roads, the contractor shall provide barricades, flagmen, and other necessary precautions for safety of the public as required by the safety requirements of these specifications.

1.3.3 USE OF LAND FOR CONSTRUCTION PURPOSES:

a. USE OF GOVERNMENT LAND: The contractor will be permitted to use Government land, controlled by the Western Area Power Administration, for field offices, construction plant, storage yards, shops, and other facilities required for construction operations, provided that such use shall not interfere with any part of the work or of the work of other contractors or of the Government in the vicinity, or with reservations made by Western for use of the land. Personnel housing will not be permitted on Government land, except housing for guards or watchmen as approved by Western.

b. USE OF PRIVATE LAND: If private land is used by the contractor for construction facilities or other purposes, the contractor shall make all

necessary arrangements with the owner and shall pay all rentals or other costs connected therewith. The contractor shall notify Western of all private land to be used as specified in the "Rights-of-way" paragraph.

1.3.4 EXISTING FENCES:

a. GENERAL: Fences on the right-of-way shall be removed by the contractor where necessary for the performance of the work, and where required, shall be rebuilt in as good condition as found. Where designated, fences shall be maintained until the work is completed or their removal is authorized. All work described in this paragraph shall be included in the Schedule for other items of work.

b. TEMPORARY FENCES: Where the contractor removes existing fences to facilitate the work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the contract. Such temporary fence protection shall be adequate to prevent public access to restricted areas. Temporary fencing constructed on the right-of-way shall be removed by the contractor as part of the cleanup operations prior to final acceptance of the completed work.

c. CONTRACTOR'S NONCOMPLIANCE: If the contractor does not provide the necessary fences and gates to adequately protect property adjacent to the right-of-way within a reasonable time after need for such protection arises, Western will have the work performed and the contractor will be backcharged.

1.3.5 TRANSMISSION, TELEGRAPH, AND TELEPHONE LINES:

a. GENERAL: The contractor shall make all necessary provisions and shall perform all work required to avoid interference with the operation or maintenance of transmission, telegraph, and telephone lines in a manner satisfactory to the owners or operators thereof and to Western.

Providing and maintaining all required watchmen, signals, guards, and temporary structures; of making necessary repairs, replacements, or similar operations; of furnishing indemnity or other bonds, if required; and all other work required by this paragraph shall be included in the Schedule for other items of work.

b. STRINGING OVER ENERGIZED POWERLINES: When stringing transmission line conductors or overhead ground wires which cross over energized electric powerlines, the contractor shall notify the owners or operators thereof of the period of time during which he intends to perform such stringing, shall obtain a written acknowledgment of such notice and shall present such acknowledgment to Western before stringing of the crossing span is started. All stringing operations shall conform to the "Safety and Health Requirements" Section and the "Electrical" Division.

1.3.6 MAINTAINING PUBLIC TRAFFIC:

a. GENERAL: The contractor shall make all necessary provisions in conformance with the safety requirements of these specifications for maintaining the flow of public traffic and shall conduct his construction operations so as to offer the least possible obstruction and inconvenience to public traffic. All work described in this paragraph shall be included in the Schedule for other items of work.

b. GUARDS AND FLAGPERSONS: At any and all points along the work where the nature of the construction operations in progress and the equipment and machinery in use are of such character as to endanger passing traffic, the contractor shall provide such guards as may be necessary to insure against accidents and avoid damage or injury to passing traffic. The contractor shall, when required or when directed by the Authorized Representative, provide and station competent flagpersons whose sole duties shall consist of directing and controlling the movement of public traffic either through or around the work.

1.3.7 GEOLOGIC INVESTIGATIONS:

a. GENERAL: The geologic logs of subsurface explorations included in these specifications, drawings 64 (FP-HV 8011) through 150 (FP-HV 8097) constitute the information and records of geologic investigations for the work. Location of subsurface investigations is shown on drawings 54 (FP-HV 8001) through 63 (FP-HV 8010).

Alignment shown on geologic drawings may not reflect more recent revisions which appear elsewhere in these specifications.

Samples and core of the recovered material were not retained. Contractors are encouraged to obtain their own samples and perform tests on the material to evaluate properties which they believe to be significant.

Copies of a report entitled "Report of Geological Investigations 230-kV Transmission Line between Fort Peck and Havre, Montana" prepared by Northern Testing Laboratories, Billings, Montana may be examined at the following Western Area Power Administration Offices.

Western Area Power Administration
Director, Division of Construction and Inspection
1627 Cole Boulevard
Golden, Colorado 80401

Western Area Power Administration
Assistant Area Manager for Engineering
2525 4th Avenue North
Billings, Montana 59101

Western Area Power Administration
Assistant Area Manager for Construction
200 4th Street SW
Huron, South Dakota 57350

The content of this report may not reflect recent design or alinement revisions which appear in these specifications.

Western does not represent that the available geologic information and records show the conditions that will be encountered in performing the work, but only that the geologic information shows conditions encountered at the particular point and time the information was obtained and may not indicate variations such as those caused by seasonal fluctuations increased rainfall and other factors which may affect the water level. The contractor shall assume all responsibility for deductions and conclusions made as to the nature of the materials to be excavated, the difficulties of making and maintaining the required excavations, and of doing other work affected by the geology and ground water elevations at the site of the work.

b. GEOLOGIC DESCRIPTION: The Ft. Peck-Havre Transmission Line is in the Great Plains physiographic province of Montana. Strata exposed along a major portion of the route is that of the Montana Group of late Cretaceous age. Some Tertiary volcanics are exposed in the western portion of the line. The area is dominated by low rolling hills combined with wide, shallow valleys. Surface topography was greatly influenced by Pleistocene glaciation. Glacial drift deposits up to about 70 feet thick can be found in the area. The major drainage is the Milk River. Alluvial deposits are associated with the Milk River and tributary drainages.

Generally, rocks associated with the Montana Group are soft sandstones and shales; however, locally, the rock is firmly cemented. Rock associated with the Tertiary volcanics are flows and flow breccia of basalts and andesites, weathered and fractured near surface and are generally hard, resistant rock. Glacial drift deposits are primarily clay till. These deposits are largely unsorted debris deposited directly from the glaciers. Randomly scattered cobbles and boulders as well as sand and gravel pockets can be encountered in the till. Alluvial deposits consist primarily of clays with sand and gravel. While much of the alluvial deposits are firm, there are areas that are very soft. Groundwater can be encountered at or near land surface locally. Groundwater or perched water can be encountered at a relatively shallow depth at isolated locations outside the alluvial deposits area.

1.3.9 ELECTRIC POWER FOR CONSTRUCTION PURPOSES:

The contractor shall make all necessary arrangements and shall provide all electric power required for his construction purposes. Providing electric power for construction purposes shall be included in the Schedule for other items of work.

1.3.10 WATER FOR CONSTRUCTION PURPOSES:

The contractor shall furnish all water required for construction purposes. The contractor shall make all arrangements for obtaining the water and provide all means for conveying the water to the points of use. Furnishing all water for construction purposes and conveying the water to the points of use shall be included in the Schedule for other items of work.

SECTION 1.4--SAFETY AND HEALTH REQUIREMENTS

1.4.1 ACCIDENT PREVENTION PROGRAM:

a. GENERAL: The contractor shall implement and administer an aggressive accident prevention program and shall take all reasonable precautions in the performance of the work under this contract to protect the safety and health of employees and members of the public and to prevent unnecessary damage to public and private property. The cost of complying with the safety and health requirements of these specifications shall be included in the Schedule for other items of work. The clause titled "Safety and Health" of the General Provisions also includes safety and health requirements.

In addition to the safety and health requirements contained within these specifications, the contractor shall not require or knowingly allow any employee engaged in work under these specifications, whether directly employed or through subcontract or onsite supply contract, to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to the employee's health or safety.

b. OSHA REGULATIONS: The contractor shall comply with the latest effective standards promulgated by the Secretary of Labor for the Department of Labor, Occupational Safety and Health Administration, Safety and Health Standards (29 CFR 1910), and the Construction Safety and Health Regulations promulgated under section 107 of the Contract Work Hours and Safety Standards Act (29 CFR 1926). In the event there is a conflict between the requirements of this Section and any applicable Federal, State, or local safety, health, or industrial regulations or code, the more stringent requirement shall prevail.

c. CONTRACTOR'S SAFETY PROGRAM: The contractor shall conduct an accident prevention program commensurate with the work requirements of these specifications and shall submit either a reproducible print or 6 copies of a proposed safety program to the Authorized Representative for approval prior to start of construction operations. The approved program shall become a part of the contract. The safety program shall include: (1) designation of a competent supervisory employee to carry out the contractor's accident prevention program; (2) a statement of company safety policy encompassing compliance with applicable, Federal, State and local safety standards and the safety requirements of these specifications; (3) provision for adequate facilities and trained personnel to ensure prompt and efficient first aid

and medical care of injured employees (minimum requirements as specified in the "Medical Services" paragraph); (4) provision for regularly scheduled and documented safety meetings at least monthly for all levels of supervision; (5) provision for weekly "tool box" safety meetings conducted and documented by a supervisor and attended by all employees at the worksite; (6) provisions for periodic safety policy meetings between contractor and Western representatives; (7) definition of company policies for determining employee skill, proficiency, and medical condition required to safely perform the duties of the position; (8) orientation and education procedures to assure employee awareness of safety and health policies and regulations; (9) fire protection procedures and facilities; (10) health and sanitation facilities; (11) contractors policy for the use and furnishing of personal protective equipment; (12) procedures that will be implemented to minimize safety hazards peculiar to the work under these specifications (e.g., structure erection program and stringing plan); (13) company policy and procedures for enforcing the safety and health regulations; (14) procedures for protecting the public; and (15) a copy of the current certificate of compliance with industrial compensation insurance statutes. Approval by Western of the contractor's safety program, supplements thereto, or any work procedure or plan shall not relieve the contractor of the responsibility for safety of persons or property.

d. FAILURE TO COMPLY: The contractor shall be cognizant of and ensure compliance with the safety requirements within these specifications, OSHA regulations, and the safety program for all contract operations including all subcontractor and onsite supply contract operations as indicated in the clause entitled "Safety and Health" of the General Provisions. Failure to fully implement the safety program may result in suspension of all or any part of the work until corrected. The contractor shall not be entitled to any extension of time, nor to any claim for damage or excess costs by reason of the suspension. Failure to correct the conditions prompting the suspension will be considered noncontract performance and can ultimately result in termination for default as defined in the clause entitled "Termination for Default" of the General Provisions. Failure of Western to order discontinuance of any or all of the contractor's operations shall not relieve the contractor of his responsibility for the safety of personnel and property.

e. RECORDS AND REPORTING: The contractor shall maintain an accurate record of, and shall report to Western in the manner prescribed, all cases of death, occupational disease, or traumatic injury to employees or the public and property damage by accident. Western shall be furnished copies of all certifications and test records including: (1) Crane Performance Tests, (2) Annual Crane Inspection Records as per OSHA 1926.550, (3) Brake Performance Test, (4) Test of Personal Grounds, and (5) Tests of Stringing Blocks and Sheaves.

f. INDEMNITY: The contractor shall indemnify and hold Western harmless for any and all losses, damages, or liability on account of personal injury, death, or property damage, or claims for personal injury, death, or property damage of any nature whatsoever and by whomsoever made, or arising out of the activities of the contractor, the employees, subcontractors,

or agents under the contract. Such indemnity shall include, but shall not be limited to, the failure of the contractor, their employees, subcontractors or agents to comply with the safety and health provisions contained in these specifications.

1.4.2 SAFETY OF THE PUBLIC:

a. ROADS: Roads subject to interference by the work shall be kept open without unreasonable delays or suitable detours shall be provided and maintained by the contractor. The contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient flasher lights, flagpersons, danger signals, and signs, and shall take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be illuminated from sunset until sunrise.

b. WARNINGS: Flagpersons shall be utilized at road crossings when warranted because of view obstruction or volume of traffic. In remote areas where the volume of traffic is light, advance warning signs or flags will suffice. The contractor shall follow the instructions as stated in ANSI D 6.1 entitled "Manual on Uniform Traffic Control Devices for Streets and Highways". At no time shall wire, rope, or chain be used to barricade a travelable trail or roadway.

1.4.3 MEDICAL SERVICE:

a. TRANSPORTATION: The contractor shall make arrangements or provide for transporting sick or injured personnel from the jobsite to an approved medical facility. Approved transportation shall be available to the worksite within 30 minutes of notification. Transportation facilities shall be approved by a consulting physician.

b. COMMUNICATION: The contractor shall provide and maintain or shall make the necessary arrangements to have available dependable radio and/or telephone communications between the jobsite and field office and the nearest emergency medical facility. Procedures and instructions for providing emergency assistance shall be posted at all job locations.

c. INJURY TREATMENT: A person who has valid certificates in first-aid training and C.P.R. from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite wherever employees are engaged in work under these specifications.

1.4.4 EMPLOYEE REQUIREMENTS:

a. GENERAL: Persons employed throughout the course of the contract shall be physically qualified to perform their assigned duties. Employees shall not knowingly be permitted or required to work while their ability or alertness is so impaired because of fatigue, illness, medications, drugs or alcohol, or any other reason that may expose themselves or others to injury.

b. PHYSICAL EXAMINATION: Each contractor employee who operates the following listed equipment shall be given and pass a Department of Transportation (DOT 49 CFR 391.43) physical examination once every 12 months: (1) cranes, (2) aerial lifts, (3) man-haul vehicles (is defined as a bus by local State statutes), (4) busses, (5) personnel hoists, (6) material hoists. A copy of the certificate shall be furnished to the Authorized Representative. The certificate shall specifically state the examiner met the requirements of DOT 49 CFR 391.43.

1.4.5 PERSONAL PROTECTIVE EQUIPMENT:

a. HARD HAT: "Hard hat areas" shall include all locations where construction work of any nature is in progress, and shall encompass the entire jobsite with exception of the parking area, the interior of shops, and offices. All employees including equipment operators, field mechanics, and others entering the area shall, without exception, wear hard hats. The contractor shall provide hard hats for visitors entering "hard hat areas". Hard hats shall meet ANSI Z 89.2 "Safety Requirements for Industrial Protective Helmets for Electrical Workers, Class B". "Hard Hat Area" signs shall be furnished and erected by the contractor.

b. HIGH VISIBILITY CLOTHING: Employees working around haulage equipment, survey personnel working on or near public thoroughfares, personnel working in areas open to big game hunting, and flagpersons shall wear safety color fluorescent clothing with a reflective area of at least 400 square inches above the waist.

c. PROTECTIVE CHAPS: Protective chaps which meet the latest U.S. Forest Service (USFS) requirements, as stated in USFS Health and Safety Code Handbook 6109.13, chapter 718.3b, shall be worn when using chain saws.

d. SAFETY BELTS: Safety belts and straps shall be used by workers while on structures.

e. SUSPENDED LADDERS:

(1) Hook or other type temporary ladders used on structures shall be provided with a safety device and its use required to ensure that the ladder will not be displaced. Ladders shall be inspected daily and repaired or replaced when strength and dependability are reduced from any cause.

(2) When working from a suspended ladder, there shall be a safety rope on each rail extending from the top to the third rung from the bottom. The safety strap shall be around both ladder rails inside the safety rope.

1.4.6 EXCAVATIONS:

a. AUGERS: Unattended augered holes shall be covered to prevent people or livestock from falling into the excavation.

b. FOOTINGS: The excavation for pad and piling-type footings shall be protected by fencing as warranted by conditions; e.g., presence of livestock and the depth and stability of the banks.

c. CONCRETE PLACEMENT:

(1) Safe equipment access, including grading, leveling, and shoring, as necessary, shall be provided in order to ensure ground stability for mixer trucks and other mobile equipment.

(2) A spotter shall assist truck and equipment operators when adjacent to excavations. Personnel shall be removed from excavations while heavy equipment is being maneuvered nearby.

(3) Work platforms shall be provided as required for forming and concrete placing in pad or piling-type footings.

1.4.7 EXPLOSIVES AND BLASTING:

a. GENERAL: The contractor shall submit a controlled blasting plan to Western for review and approval prior to blasting.

b. EXPLOSIVES: The transportation, handling, storage, and use of explosives shall be subject to the provisions of subpart U - Blasting and the Use of Explosives - of the Department of Labor "Safety and Health Regulations for Construction", and the regulations of the Department of the Treasury contained in 26 CFR 181, Commerce in Explosives. "Inhabited building", as shown under the American Table of Distances for Explosive Materials, shall include the contractor and Government offices, shops, warehouses, storage areas, and similar structures. The contractor's inventory and use record shall be available for review by Western at all times.

c. BLASTING: Blasting will be permitted only after adequate provision has been made for the protection of persons, the work, and public or private property. Damage to the work or to public or private property by blasting shall be repaired by and at the expense of the Contractor. No electrical-type blasting system shall be used within 500 feet of energized lines or equipment. All blasting shall be done between sunrise and sunset.

d. VIBRATION AND DAMAGE CONTROL: Blasting in or adjacent to cofferdams, buildings, dwellings, structures, or other facilities susceptible to vibration or airblast damage shall be carefully planned and controlled to eliminate possibility of damage to such facilities and structures. Such plan for control to eliminate vibration and/or airblast damage,

when required by Western, shall be submitted to and approved by Western prior to commencement of blasting. Such control will include, as a minimum, provision for monitoring blasts with calibrated devices containing triaxial orthogonal velocity transducers with a frequency response from 2 to 200 hertz. The maximum peak particle velocity as recorded at the designated structures or locations shall not exceed one (1) inch per second. All recording devices shall privide a real-time direct readout permanent record of vibration or airblast measurements and a copy shall be submitted to Werstern. Vibration and airblast monitoring shall be done in locations, when required, specified by Western.

e. MEASUREMENT FOR ATMOSPHERIC STRAY CURRENTS: When electric blasting methods are used, the contractor shall provide a means of adequately measuring for atmospheric stray currents by using approved equipment designed for this purpose.

f. BLASTER CERTIFICATION: In states having requirements for formal certification or licensing of blasters and/or explosives purchasers, the contractor shall comply.

1.4.8 MATERIALS HANDLING AND STORAGE:

a. STORAGE: Storage yards shall be laid out in such a manner as to permit loading and unloading without backing maneuvers. Steel and heavy materials shall be stacked on adequate lagging to prevent shifting.

Cylindrical shaped material such as poles and pipe shall be handled with extra caution to prevent unplanned movement from endangering personnel and property. Material and equipment arriving on transports from any source shall be examined to determine if additional lagging or additional load securing method is necessary to protect personnel engaged in rigging and unloading operations.

b. TAG LINES: Tag lines shall be utilized to maintain control of materials or structures being raised or lowered, except where the use of such lines would create a greater hazard.

c. HANDLINES: Handlines, including all hardware, shall have a minimum safety factor of 3.

d. TOOLS AND MATERIALS: Tools and materials shall not be thrown or dropped from structures. Handlines and tool bags shall be used.

1.4.9 EQUIPMENT:

a. GENERAL:

(1) Operators: Machinery and mechanized equipment shall be operated only by persons trained and authorized to do so. Equipment operators shall be responsible for the safe operation of their equipment at all times. When required by Western, the contractor shall furnish a copy of the equipment operator's qualification record.

(2) Riding on Equipment: Riding on equipment is prohibited unless a safe place to ride is provided. A safe place to ride is defined as a permanently affixed seat with passenger restraint device. Getting on or off equipment while in motion is prohibited.

(3) Equipment Lockout: All equipment shall be equipped with provision for tagging and locking out the controls while under maintenance, cleaning, and repair. An approved lockout and tagout procedure shall be established, prescribing specific responsibilities and safety procedures to be followed by the persons performing the repair work.

(4) High-voltage Lines (600 volts and greater): Equipment shall not be operated where it is possible to bring the equipment or any part of the equipment within 10 feet of any high-voltage line or installation unless at least one of the following safety precautions has been taken:

(a) The utility company or owner of the line has been notified, the line deenergized and grounded, and positive control measures taken to prevent energization of the line during the progress of the work.

(b) Adequate guards or barriers have been erected or exist to prevent the equipment or any part thereof from approaching closer than clearances listed in OSHA 1926.950 Table V-1 to an energized conductor. These guards or barriers shall provide positive prevention of contact and not rely on visual observations.

A notice of the distance limitation shall be posted in the operator's cab of cranes, shovels, backhoes, and related equipment.

(5) Safe Condition: Before any machinery or mechanized equipment is initially used on the job, it shall be inspected and tested by qualified contractor personnel who shall determine that the equipment is in safe operating condition and is appropriate for the intended use. Operators shall be instructed to check their equipment daily, prior to use, and report any deficiencies.

(6) Brakes: When directed by Western or when otherwise required, the contractor shall carry out a braking performance test on all onsite equipment. Such test shall be conducted by the contractor in the presence of the Authorized Representative and a record of the test shall be provided to the Authorized Representative.

(7) Walking/Working Surfaces: Ladder, steps, platforms, and walkways on equipment shall be provided with nonslip surfacing material to reduce the possibility of slipping. The nonslip surface shall be maintained in safe and effective condition at all times.

b. OPERATOR PROTECTION: All equipment defined by the U.S. Department of Labor Safety and Health Regulations for Construction in 29 CFR 1926.1000 and manufactured after July 1, 1969, shall be equipped with Rollover

Protection Service (ROPS) meeting those standards. Equipment with ROPS or protective frames shall have seat belts that are installed in accordance with SAE Recommended Practice J386. In addition, the following special standards apply to equipment operated under these specifications.

(1) Farm and Industrial Tractors: All rubber-tired farm and industrial tractors shall be equipped with protective frames designed and installed to meet or exceed the recommended minimum performance criteria as set forth in SAE Standard J334, "Protective Frame Performance Requirements", date of manufacture notwithstanding.

(2) Tuggers and Tensioners: Operators of tensioners and tuggers shall be totally protected from contact with bull wheels, cable drums, and tension-line snap back.

c. LIFTING DEVICES:

(1) General: A lifting device is any machine or apparatus used to raise, shift, or lower equipment, materials, or personnel. All devices shall be designed and manufactured or fabricated for their intended use and shall comply with this paragraph and all applicable American National Standards Institute (ANSI) standards. The definitions contained in OSHA 1910 subpart N and 1926 subpart N shall apply to this paragraph.

(2) Mobile Cranes: All crawler, truck, and wheel-mounted cranes shall meet applicable requirements for design, inspection, construction, testing, maintenance, and operation as prescribed in ANSI B 30 (exception in last sentence of B 30.15-0.1 not withstanding).

(3) Aerial Lifts: Mobile lifting devices used to raise, shift, and lower personnel shall meet all applicable requirements of ANSI A 92.2 (date of manufacture notwithstanding). Work platforms suspended from crane load lines or attached to the elevating platform or forks of powered industrial trucks, loaders, and similar equipment will not be permitted.

(4) Other Mobile Lifting Devices: Fabricated mobile lifting devices such as truck-mounted A-frame, gin poles, and similar equipment shall be designed and constructed incorporating the following safety factors: a minimum safety factor of 5 for chains, standing part or guy cables, boom supports, and other load-carrying boom parts; and a minimum safety factor of 3.5 for all live or running cable reevings including boom-hoist cables, shackles, load lines, hooks, and accessories. Welds on structural members whose failure would result in load drop shall be performed by a certified welder and nondestructively tested to assure adequate strength. Prior to use under these specifications, a written certification from a registered professional engineer, competent in structural analysis, shall be provided to Western stating the design capacity of the lifting device and that it meets the requirements of this paragraph. Subsequent modification or alterations to load-carrying parts will require recertification. Design capacity shall be posted at the operator's station.

(5) Testing: Prior to initial use on work covered under these specifications and following modification, alteration or repair, the contractor shall load test all hoisting equipment, at the jobsite, in the presence of the Authorized Representative. The load test shall involve lifting, swinging, and brake holding a load of at least 100 percent but not more than 110 percent of the load chart rating for a specific configuration and load radius. The configuration, load radius, and test weight shall be chosen so as to prove the machine capability and load chart accuracy for the anticipated use of the equipment under these specifications. The test load shall not exceed the maximum rated capacity of the machine or any load chart rating which is based on structural limitations. The configuration shall provide a boom angle of at least 30° above the horizontal.

(6) Alteration and Repairs: Repairs shall be in strict compliance with manufacturer's instructions with repairs to structural load-carrying parts certified by the manufacturer or a registered professional engineer competent in structural analysis.

d. HELICOPTERS:

(1) General: All helicopter operations shall comply with applicable FAA standards, OSHA 29 CFR 1926.551, and this paragraph.

Prior to starting such an operation, the contractor shall submit a written operations/safety program for Western review and approval. This program shall include copies of manufacturer's data on aircraft, aircraft airworthiness certificate, qualifications of pilot, and pilot's current license, general flight operations safety requirements, and specific procedures for work operations (e.g., helicopter crane, pulling lines, and other similar operations).

e. SECURE EQUIPMENT: The contractor shall ensure that all motor vehicles and mechanized equipment are properly secured when not being used to prevent any rollaways, unauthorized operation, or movement of accessories and attachments.

1.4.10 GROUNDS, BONDS, AND OTHER PERSONNEL PROTECTIVE DEVICES:

a. GENERAL: Electrical circuits, equipment and conductors; construction equipment and other conductive apparatus used in proximity of energized facilities shall be considered an electrical hazard to personnel and shall be considered energized until grounded and/or bonded in an approved manner. No work will be performed under these specifications on energized equipment and circuits and the following minimum distances will be maintained.

TABLE 1-3

Voltage range (phase to phase) kilovolts	Minimum working and clear hot stick distance
2.1 to 15	2 ft. 0 in.
15.1 to 35	2 ft. 4 in.
36.1 to 46	2 ft. 6 in.
46.1 to 72.5	3 ft. 0 in.
72.6 to 121	3 ft. 4 in.
138 to 145	3 ft. 6 in.
161 to 169	3 ft. 8 in.
230 to 242	5 ft. 0 in.
345 to 362	7 ft. 0 in.
500 to 552	11 ft. 0 in.
700 to 765	15 ft. 0 in.

b. DEFINITIONS: The following definitions of terms apply to the protection of personnel from electrical shock:

(1) Approved Ground: An approved ground shall be (a) a station ground mat, (b) an installed structure ground, (c) 5/8-inch diameter by 10 foot long copperweld or galvanized-type rod embedded to a depth of at least 8 feet, or (d) equivalent. Equivalent grounds may be used when the contractor can prove grounding resistance equal to or less than (c) above.

(2) Grounding: Grounding is electrically connecting a conductive object to an approved ground.

(3) Bonding: Bonding is electrically connecting a conductive object to other conductive objects.

(4) Approved Ground and Bond Leads: Approved ground and bond leads shall be a minimum 1/0 AWG extra flexible copper or 3/0 AWG extra flexible aluminum or equivalent. An exception will be ground or bond leads attached to No. 2 AWG structure grounds, which may be No. 1 AWG extra flexible copper or equivalent. The leads shall be constructed with commercial connectors installed in accordance with manufacturer's instructions and shall have a current carrying capacity equal to the capacity of the cable. Leads will normally not exceed 40 feet in length.

(5) Hot Stick Ground Lead Connector: A hot stick ground lead connector is one designed for installation with an insulated fiberglass rod or hot stick. The hot stick may be an integral part of the connector or the connector may be designed for use with a universal or utility type hot stick. Connectors shall be the self-cleaning clamp type.

(6) Drag Chain Ground Lead: A drag chain ground lead is a steel or steel alloy chain securely bolted to the chassis of mobile construction equipment. The chain shall have links at least 1 inch in length and the overall chain length shall be sufficient to provide 1 foot of ground contact when the equipment is not moving. A drag chain is an extremely undependable ground and will be used only when no other ground lead is feasible and equipment grounding is required.

(7) Three Phase Grounded Short: Three phase grounded short means the electrical connection of all three phases of an electrical circuit to a common point and to an approved ground. The electrical connection shall be made with approved ground leads (normally less than 40 feet in length) and hot stick connectors.

(8) Grounded Travelers: Grounded travelers are stringing sheaves or blocks used to make electrical connection to conductors, conductive pulling lines and overhead ground wire. They must be designed and constructed for this purpose. Western encourages the use of grounded travelers that incorporate a separate spring tensioned sheave to provide the contact surface.

(9) Barricades: Barricades are intended to warn adequately trained employees and other knowledgeable personnel to stay away from or out of certain areas. They shall be constructed of high visibility non-conductive weather resistant material such as yellow or orange synthetic fiber rope and be adequately supported so as not to be easily displaced and maintain a height of approximately 42 inches above walking level. They shall be located so as to prevent any person obeying the barricade from contacting conductive objects within the barricade.

(10) Barriers: Barriers are intended to physically prevent children and livestock from entering an area and make the existence of a hazard apparent to all other persons. They shall be at least 60 inches high and supported to prevent displacement. Supports shall be constructed and located so as to not enhance climbing. The barrier shall be located to prevent any person obeying it from contacting conductive objects within the barrier. If constructed of conductive materials, the fence shall be connected to an approved ground near the fence perimeter with an approved ground lead. Signs shall be placed on the barrier and shall be 10 inches x 14 inches in size, visible from all approach directions and read "Danger, High Voltage".

(11) Isolation Platform: An isolation platform is a working or walking surface used to prevent personnel from contacting two conductive objects or one conductive object and ground simultaneously. Isolation platforms shall be constructed of a 2-inch nominal dimension lumber supported on 4-inch nominal dimension sills. When used on wet or soft ground, additional supports will be provided to assure the platform stays above the ground surface. Other materials may be used that provide equivalent protection if approved by Western.

(12) Grounded Work Mat: A grounded work mat is a working or walking surface used to eliminate step potentials in a work area. The mat can be constructed of woven wire fencing or concrete reinforcing mesh and shall be grounded to an approved ground within 10 feet of each end of the mat. Access to the mat will be accomplished with an isolation platform.

c. TESTING AND CERTIFICATION:

(1) Ground Leads: Ground leads including the connectors shall be tested and certified to withstand a fault current of 15,000 amperes for 30 cycles with a voltage drop of 75 volts or less. When No. 1 AWG ground leads are permitted, they shall be tested to withstand a fault current of 12,000 amperes. The testing shall be in accordance with the Bureau of Reclamation Power O&M Bulletin No. 5 and Power Maintenance instruction No. 59 or an approved equivalent test procedure. Ground leads shall be retested and recertified annually.

(2) Grounded Travelers: Grounded travelers that accomplish the electrical connection with conductive impregnation of the neoprene or other nonconductive sheave lining shall be new for work under these specifications or a certification of test for conductive capability shall be provided to the Authorized Representative. Each conductive sheave used for required grounding shall be retested every 90 days after being subjected to a fault current or as directed by Western. Testing shall be adequate to prove no major conductive deterioration from the manufacturer's original rating. Each such sheave or block shall be marked or tagged with an individual number and a test log maintained.

(3) Grounded Travelers: Grounded travelers that incorporate a separate spring tensioned sheave shall be designed and installed to provide 1 ohm or less resistance between the conductor, conductive pulling line, or overhead ground wire and the approved ground. This test can be performed at the worksite in the presence of a Western representative.

1.4.11 CLEARANCES, HOT LINE ORDERS, AND SPECIAL WORK PERMITS:

a. GENERAL: The contractor shall secure information from the Authorized Representative concerning which facilities are energized at or near each worksite, take all necessary precautions for the safety of personnel, and keep employees fully informed of the work situation, including safe work limits.

b. DEFINITIONS:

(1) Clearance: A Clearance is a procedure whereby energized electrical facilities are deenergized and switches, disconnecting switches, and circuit breakers are tagged or locked to prevent reenergization.

(2) Hot Line Order: A Hot Line Order is a procedure whereby adjacent electrical facilities may remain energized during constractor operations, but provides that if any circuit breaker connected to the facilities opens under fault conditions, it will not be reclosed until all equipment and employees working in the area are determined to be in the clear.

(3) Special Work Permit: This is the written permit issued by Western which indicates the limits of the work area, restrictions, and conditions pertinent to the work. It will be issued to the contractor at the worksite.

c. JURISDICTION: Western's substations and transmission lines are under the jurisdiction of Western's power operation and maintenance staff and are subject at all times to their standard operating procedures and regulations.

Provisions will be made to deenergize only those buses and circuits as necessary to accomplish the work. Such deenergization will be carried out on a progressive, preplanned basis, determined by the progress of construction. Certain operating facilities will be released only at prescheduled times, such as offpeak periods, in order to maintain continuity of commercial electrical service.

d. PROCEDURES TO OBTAIN SPECIAL WORK PERMIT:

(1) A request for a Special Work Permit shall be made in writing at least 10 working days prior to the anticipated work. The request shall include the plan of operation indicating the work to be done, sequence of operations, time to start work, duration of work, number of employees and their classification, safety precautions to be taken, type and location of barricades, warning signs, protective grounds, and description of equipment to be used in performing the work.

(2) Following approval of the contractor's plan of operation, and after obtaining a Clearance or Hot Line Order, Western's representative at the jobsite will issue a Special Work Permit to the contractor's job supervisor.

(3) The Special Work Permit will indicate the limits of the work area, restrictions, and conditions pertinent to the Clearance and/or Hot Line Order. Both the contractor and Western's representative at the jobsite, shall sign the Special Work Permit and each retain a copy.

(4) The contractor shall review the Special Work Permit and limits of the work area with the employees before proceeding with the work, and as frequently thereafter as necessary to ensure that all employees are knowledgeable of the work program and the required safety precautions.

(5) After receipt of a Special Work Permit for a Clearance and prior to commencement of any other work, the contractor shall install personnel protective grounds in accordance with the previously approved plan. Minimum grounding shall include a three-phase grounded short which shall be accomplished under the observation of the Western representative in the following sequence:

(a) Using a hot stick of sufficient length to maintain the clearances distances contained in Table 1-3 of the "Grounds, Bonds, and Other Personnel Protective Devices" paragraph, feel out the circuit to ascertain it is deenergized.

(b) Install the ground leads by first attaching the leads to the approved ground.

(c) Attach the ground leads to the deenergized circuit with a hot stick maintaining clearances contained in Table 1-3 of the "Grounds, Bonds, and Other Personnel Protective Devices" paragraph until all ground leads are attached. This clearance requirement includes all parts of the ground lead being attached.

Additional grounding may be required depending on the type and location of work being performed. Recent studies by Western and other utilities have disclosed that in order for a ground to provide a shunt for a workman it must be located at or near the worksite in a manner that will prevent ground gradient voltage drops.

e. RELEASE OF SPECIAL WORK PERMIT: After the work has been completed, the contractor's job supervisor shall advise Western's representative, and the following will occur:

(1) Western's representatives will check to determine that the equipment installed or modified is satisfactory for normal service or energization, or is in safe condition for the action to be released.

(2) The contractor shall then remove all grounds, bonds, and other protective devices under the observation of Western's representative. The three-phase grounded short shall be removed in the reverse sequence of subparagraph d.(5) above.

(3) The contractor's job supervisors holding the Special Work Permit shall sign both copies of the release of the Special Work Permit certifying that all personnel are in the clear and will remain in the clear and that all grounds, bonds, and protective devices have been removed.

f. TRANSFER OF RESPONSIBILITY FOR SPECIAL WORK PERMIT: Should it be necessary to transfer the responsibility for work under a Special Work Permit from one contractor's job supervisor to another, the following shall occur:

(1) A new Special Work Permit will be issued to the new job supervisor by Western's representative with an explanation of the limits of the work defined thereon.

(2) Western's representative and the new job supervisor will review the location and integrity of all grounds, bonds, and other protective devices.

(3) The old Special Work Permit may then be released.

1.4.12 TRANSMISSION LINE SAFETY REQUIREMENTS:

a. SUPERVISOR QUALIFICATIONS AND COMPETENCY: The contractor shall furnish a copy of the supervisor's work history containing the supervisor's background, training, and competency in the work to be performed.

b. ACCESS: Where access to the line right-of-way and downline access road or trail construction is permitted, they shall be built and maintained in a safe condition, including road approaches, filling of ditches, and installation of drainage structures where terrain dictates. In areas where environmental considerations or other restrictions will not permit access road or trail construction or improvement, the contractor shall alter construction methods and/or furnish and use equipment which will operate safely under existing conditions. Where power or telephone lines parallel a road being crossed, approaches shall be constructed to provide adequate clearance for cranes, aerial lifts, and other equipment.

c. STRUCTURE ERECTION: Procedures for erecting wood, concrete, and steel structures shall be made a part of the safety program. The structure-erection plan shall include, but not be limited to, the following subjects: assembly, lifting, shoring, size and type of hoisting equipment, operator qualifications, crane signal/communication, connecting rigging, guying, moving equipment, and protection for adjacent energized power facilities.

d. CONDUCTOR AND OVERHEAD GROUND WIRE STRINGING: Overhead ground wire and conductive pulling lines shall be considered the same as conductor in terms of required safety precautions during installation.

(1) Contractor's Plan Required: Procedures for the stringing, sagging, and clipping operations shall be made a part of the Safety Program. The plan shall consist of a description of the stringing method proposed and include: the type of stringing equipment to be used; grounding and bonding devices and procedures; barrier and barricade design as applicable; isolation platform design and use; utility, highway, railway and waterway crossing methods including guard structure design; clearances required; copies of manufacturer's certificates and/or certifications required by subparagraph c. of the "Grounds, Bonds, and Other Personnel Protective Devices" paragraph and the determination required by subparagraph h.(1) below.

(2) Miscellaneous: Pulling and braking machines shall be well aligned and firmly anchored against displacement. Operators shall remain at the controls at all times when wire is being pulled. The speed of pull shall not be in excess of that specified by the manufacturer. Tension on the wire shall be maintained as near constant as possible. The pulling and braking machine operators shall be in constant voice communication in order that the operation may be halted immediately in the event of an emergency. Reel jacks shall have ample capacity, operate smoothly, and be equipped with adjustable brakes to control the reels while pulling. Reels shall be firmly attached to the reel jacks and the reel jacks anchored in a manner that will prevent displacement or overturning in the event of a fouled reel or brake lockup while pulling.

Attachment between pulling lines and the conductor being strung shall be of adequate capacity and so constructed to allow the lines to flow freely through the stringing blocks. A designated person in direct communication with the pulling machine operator shall watch such attachment through each structure. The ends of socks shall be taped to ensure against slippage. If a conductor being strung should catch under any firm object, no attempt shall be made to free the conductor until the pulling has been stopped and the tension slacked off.

No person shall be allowed on any structure within the pulling area when conductor or pulling line is being pulled.

Stringing operations shall be terminated when electrical storm activity is present in the area.

e. BARRICADES: A barricade shall be used to enclose the area between the tensioner and reel jacks. Entering the area will be permitted only with the knowledge of the tension and pulling machine operators when all pulling is stopped and undesired tension released.

f. GROUNDING AND BONDING:

(1) All pulling equipment, reels, and tensioning equipment shall be grounded to an approved ground. Only one approved ground shall be used at each site and all equipment at the site shall be bonded together or grounded at a common point.

(2) An approved grounded traveler shall be used at the first structure adjacent to both the pulling and tensioning setup. It shall be bonded to the metal structure or structure ground at or near the conductor level.

(3) During splicing operations at ground level, both conductor ends shall be grounded to a common approved ground using hot stick ground lead connectors. When splicing from an aerial device, the aerial device shall be grounded and the basket or platform shall be bonded to both conductor ends using hot stick ground lead connectors.

(4) When making dead end or tension structure conductor measurements or attachments, or installing jumpers, all conductors shall be bonded to the structure ground using hot stick ground lead connectors. Aerial devices used shall be grounded and the basket or platform bonded to the structure and/or conductor as appropriate.

(5) Aerial workers (e.g., clipping crews) shall place bonds at each structure in a manner that will provide a shunt between any two conductive surfaces they may contact. A hot stick ground lead connector shall be used for this purpose. Aerial devices shall be grounded and the basket or platform bonded to the structure and/or conductor as appropriate.

(6) Permanent construction grounds shall be maintained on each isolated line section and shall remain in place until all aerial work is complete. They shall be progressively removed as part of the final aerial cleanup. Dead end structure jumpers shall generally be left open to isolate line sections and grounds shall not be installed on these structures.

(7) If for any reason work on conductors is required in a manner or sequence that may result in continuity across the open jumpers, except during jumper installation, after removal of the permanent construction grounds, and jumpers installed, a Special Work Permit is required with a three-phase grounded short at the worksite.

g. CROSSING EXISTING CIRCUITS, HIGHWAYS, RAILROADS, AND TELEPHONE LINES: The owner, utility, or authority having jurisdiction shall be notified in advance of making all such crossings and all necessary permits obtained by the contractor. The following safety precautions shall be taken and the procedures followed by the contractor:

(1) Prior to stringing over or under an existing powerline, the contractor shall inform the owner or utility company and request the existing line be deenergized. the contractor shall obtain proper clearances and ground all phase of the deenergized line on both sides of the crossing. In the event the existing line cannot be deenergized and grounded, the contractor shall request the automatic reclosers be made inoperative and a Hot Line Order placed on the existing energized line. The contractor shall be responsible for securing Hot Line Orders and/or Clearances from the respective utility on non-Western lines. Western shall be kept fully informed, in writing, of all such Hot Line Orders and Clearances.

(2) Protective guard structures shall be installed at all crossing. These structures shall be designed and installed to ensure that adequate clearance is continually maintained between the pulling lines or conductors and the facility being crossed. Clearances from energized lines shall be at least 5 feet but never less than the distance in Table 1-3 of subparagraph a. in the "Grounds, Bonds,

and Other Personnel Protective Devices" paragraph for the voltage being crossed. These structures will remain in place until clipping is completed on structures adjacent to the crossing.

(3) Ropes utilized as lead lines at energized crossings shall be nonconductive and shall be kept clean and dry to protect their dielectric strength.

(4) The conductive pulling lines and conductors shall be grounded at each structure adjacent to energized line crossings. This can be accomplished with grounded travelers during stringing operations but prior to removal of grounded travelers for conductor clipping they shall be replaced with hot stick clamp-type grounds. These grounds shall remain until clipping is completed on structures adjacent to the crossing.

(5) All hot line, highway, and railroad crossings shall be attended when wire is being pulled. Each attendant shall be provided a means of direct communication with the pulling machine operator.

(6) A barricade shall be used to enclose all equipment at the pulling site while threading lead lines and pulling lines. Access to the equipment shall be accomplished with an isolation platform. Entering the barricaded area shall not be permitted without permission of the stringing supervisor.

h. STRINGING ADJACENT TO ENERGIZED LINES: In addition to the above requirements, the following shall apply when stringing adjacent to the energized lines:

(1) General: Induced voltage in transmission line conductors and pulling lines due to electrostatic and electromagnetic coupling with adjacent energized lines is a recognized hazard with extreme injury potential. Therefore, additional precautions must be taken when stringing under these conditions to provide a safe working environment. Western has made a preliminary review and identified the line reaches shown in Table 1-1 of subparagraph d. in the "Description of Work" paragraph as having the potential for developing dangerous voltage levels under certain loading, surging and/or fault conditions on the energized line. The contractor shall make a final jobsite review prior to stringing to define additional adjacent facilities that may have been omitted from Table 1-1 of subparagraph d. in the "Description of Work" paragraph.

The contractor shall incorporate, in the Safety Program, the results of his final review and precautions that will be taken in all areas identified. Precautions shall include requesting and receiving a clearance from the utility controlling the adjacent energized circuit or implementing the requirements of OSHA 1926.955(d), subparagraph (2) and (3) below. The precautions contained herein are not all-inclusive

depending on the actual stringing procedures and equipment utilized by the contractor. The contractor shall evaluate all work procedures to assure that employees are not exposed to hazardous induce voltages and/or step or touch potential.

Precautions shall be continued beyond the identified areas until the conductor being strung can be isolated by open jumpers or a dead end structure.

(2) Barriers and Barricades:

(a) A barrier shall enclose all equipment at the pulling and tensioning sites with access to the equipment accomplished with isolation platforms. If left unattended, with conductors or conductive pulling lines in the travelers, access points to the equipment shall be closed.

(b) A barrier shall enclose catchoff points and unattended conductor tails. Employees making catchoff connections and sag adjustments shall work from isolation platforms or grounded working mats.

(c) Conductor tails, when laid out, shall be placed on isolation platforms or grounded working mats and barricades utilized to prevent access except at the splice location.

(d) Aerial lifts used for splicing or clipping shall be barricaded and an isolation platform used for access to the equipment.

i. GROUNDS AND BONDS: Approved grounds utilized to ground equipment and conductors inside of a barrier or barricade shall be located inside and at least 10 feet from the perimeter of the barrier or barricade.

1.4.13 REMOVAL OF EXISTING TRANSMISSION LINE:

Prior to removal of the existing transmission line, the contractor shall submit for approval his detailed plan for removal. The plan shall include at least the following: method and safety precautions to be used in removing the conductor due to parallel energized facilities, other hot line crossings and road crossings; releasing the tension on the conductor to prevent structural failure; and crossarm, pole and anchor removal. Applicable precautions contained in subparagraph d. of the "Transmission Line Safety Requirements" paragraph shall be incorporated into this plan.

SECTION 1.5--ENVIRONMENTAL QUALITY PROTECTION

1.5.1 ENVIRONMENTAL REQUIREMENTS:

a. GENERAL: The contractor shall comply with all Federal, State, and local environmental laws, orders and regulations. All work required under the environmental requirements of these specifications shall be included in the Schedule for other items of work.

b. GENERAL PROVISIONS CLAUSES: The General Provisions contain clauses applicable to environmental protection requirements as follows: "Clean Air and Water"; "Cleaning Up"; "Protection of Existing Vegetation, Structures, Utilities, and Improvements"; "Environmental Litigation". In addition to these requirements, the paragraphs in this Section specify further measures to be followed in the performance of the work under these specifications.

1.5.2 LANDSCAPE PRESERVATION:

a. GENERAL: The contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring, and defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent works, approved construction roads, and excavation operations, all trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage by the contractor's construction operations and equipment. Except as otherwise provided in the Clearing Section of these specifications, the edges of clearings and cuts through trees, shrubbery, and vegetation shall be irregularly shaped to soften the undesirable visual impact of straight lines. Movement of crews and equipment within the right-of-way and over routes provided for access to the work shall be performed in a manner to prevent damage to grazing land, crops, and property.

Special reseeding or replanting will not be required under these specifications; however, on completion of the work, all work areas shall be scarified or left in a condition which will facilitate natural revegetation, provide for proper drainage, and prevent erosion. All destruction, scarring, damage, and defacing of the landscape resulting from the contractor's operations shall be repaired by the contractor as directed by the Authorized Representative, at the contractor's expense.

b. CONSTRUCTION ROADS: The location, alignment, and grade of construction roads shall be subject to approval of Western. When no longer required by the contractor, construction roads shall be restored to the original contour and made impassable to vehicular traffic. The surfaces of such construction roads shall be scarified as needed to provide a condition which will facilitate natural revegetation, provide for proper drainage, and prevent erosion.

c. CONSTRUCTION FACILITIES: The contractor's shop, office, and yard area shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. On abandonment, all storage and construction buildings, including concrete footings and slabs, and all construction materials and debris shall be removed from the site. The area shall be regraded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.

1.5.3 PREVENTION OF WATER POLLUTION:

a. GENERAL: The contractor's construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, flowing or dry watercourses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, excavated materials, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

b. EXCAVATED MATERIALS: Excavated material or other construction materials shall not be stockpiled or deposited near or on streambanks, lake shorelines, and other watercourse perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the actual watercourse itself.

c. STREAM CROSSINGS: Stream crossing shall be done in an approved manner. Crossing of certain streams may not be possible.

1.5.4 ABATEMENT OF AIR POLLUTION:

a. GENERAL: In conduct of construction activities and operation of equipment, the contractor shall utilize such practicable methods and devices as are available to control, prevent, and otherwise minimize emissions or discharges of air contaminants.

b. EMISSION OF DUST: The emission of dust into the atmosphere will not be permitted during manufacture, handling, and storage of concrete aggregates, and the contractor shall use such methods and equipment as are necessary for the collection and disposal, or prevention, of dust during these operations. The contractor's methods of storing and handling cement and pozzolans shall also include means of eliminating discharges of dust into the air. Dust nuisance resulting from construction activities shall be prevented in accordance with subparagraph d. below.

c. EQUIPMENT AND VEHICLE EMISSIONS: Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.

d. DUST ABATEMENT: Dust nuisance resulting from construction activities shall be prevented by periodic watering of disturbed soils on access and haul roads. Oil and other petroleum derivatives shall not be used for dust control.

1.5.5 PRESERVATION OF CULTURAL RESOURCES AND DATA:

a. GENERAL: Federal legislation provides for protection, preservation, and collection of scientific, prehistorical, historical, and archeological data, including bones, relics, and specimens, which might otherwise be lost due to alteration of the terrain as a result of any Federal construction project.

b. KNOWN CULTURAL SITES: Following issuance of notice to proceed, Western will provide the contractor with two sets of Plan and Profile drawings showing all known significant historical or archeological sites located on or immediately adjacent to the transmission line right-of-way. These sites shall be considered avoidance areas. Prior to any construction activity, the contractor shall mark the avoidance areas on the ground to the satisfaction of the Authorized Representative. There are approximately 20 sites involved. The contractor shall instruct his employees, subcontractors, or other representatives that vehicular or equipment access to these areas is prohibited. If access is absolutely necessary, the contractor shall first obtain approval from the Authorized Representative. The ground markings shall be maintained throughout the duration of the contract. Western will remove the markings at its discretion during or following final cleanup.

c. UNKNOWN CULTURAL SITES:

(1) Reporting: If the contractors or any of his employees in the performance of work under these specifications discovers evidence of possible scientific, prehistorical, historical, or archeological data, the Authorized Representative shall be notified immediately and given the location and nature of the findings. The contractor shall forward written confirmation within two days. The contractor shall stop all activities within a 50-foot radius of the discovery site and shall not proceed with work activities at the site until permitted to proceed by the Authorized Representative.

(2) Care of Evidence: The contractor shall exercise care so as not to damage artifacts or fossils uncovered during his construction operations and shall provide such cooperation and assistance as may be necessary to preserve the findings for removal or disposition by Western.

d. CONTRACT ADJUSTMENTS: Where appropriate by reason of a discovery, the Contracting Officer may order delays in the time of performance, or changes in the work, or both. If such delays, or changes, or both, are ordered, the time of performance and contract price shall be adjusted in accordance with the applicable clauses in the General Provisions.

e. SUBCONTRACTS: The contractor shall insert this paragraph in all subcontracts which involve the performance of work on the terrain of the site.

1.5.6 DISPOSAL OF WASTE MATERIALS:

a. GENERAL: The contractor shall remove from the right-of-way all waste materials including trees, refuse, garbage, sanitary wastes, industrial wastes, and oil and other petroleum products. Burning or burying of waste materials on the right-of-way will not be permitted. All materials resulting from the contractor's clearing operations shall be removed from the right-of-way.

b. REMOVING WASTE MATERIALS: All waste material shall be removed from the area prior to completion of the work and shall become the property of the contractor. Materials to be disposed of by dumping shall be hauled to an approved dump. The contractor shall make all necessary arrangements with private parties and with local officials pertinent to locations and regulations of such dumping. Any fees or charges for dumping of materials shall be paid by the contractor.

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DIVISION 2 - SITEWORK

SECTION 2.1--REMOVING TRANSMISSION LINE

2.1.1 REMOVING EXISTING 161-KILOVOLT TRANSMISSION LINE:

The item of the Schedule entitled "Removing existing transmission line" includes removing all conductor, complete with all accessories, and wood pole structures, including guys and anchors, and performing backfill and necessary grading at structure sites. Time schedule for commencing removal of the existing transmission line is provided for under the "Commencement, Prosecution, and Completion of Work" paragraph.

The contractor shall submit for approval a detailed plan for removal of the existing transmission line. The plan shall include the method and proposed safety precautions for at least the following:

a. Removing the conductor in parallel to the existing 69-kV system, hot line crossings, and road crossings.

b. Releasing the tension on the conductor to prevent structural failure.

c. Crossarm, pole and anchor removal.

d. Traffic control for U.S. Highway No. 2.

A large portion of the existing transmission line is in either irrigated or dryland fields. No equipment will be allowed in any field with a growing crop.

The existing line was constructed in 1934-1935 and is wood pole, H-framed with three conductors and without overhead ground wire.

For information, the following list gives approximate quantities of materials which shall be removed. The contractor shall determine actual quantities and regardless of the quantities removed, payment will only be made for the lump sum price bid in the Schedule.

Two-Pole Structures	1,521
Three-Pole Structures . . .	121
Six-Pole Structures . . . . with Switches	2
Single Guys	746
Double Guys	270
Single Anchors	640
Double Anchors	125

300-Kcmil Copper Conductor . . . . . 39.5 miles

477-Kcmil ACSR Conductor . . . . . 149.1 miles

The existing poles and guy anchors may be completely removed or cutoff 24 inches below ground surface in grassland and 36 inches below ground surface in cropland.

In the Bowdoin National Wildlife Refuge, line removal will not be allowed during May and June. The Refuge management prefers that line removal be accomplished July through September or November through February.

Fifty of the newer undamaged crossarms removed from the old line as designated by the Authorized Representative shall be delivered to the Ft. Peck District Office.

The contractor is advised that the wood poles were treated with a 10 percent solution of pentachlorophenol in 1965. Disposal of wood poles shall be in accordance with all State, Federal, and local laws and regulations. If the poles are placed on sale, the contractor shall inform prospective buyers of the chemical treatment.

None of the materials removed from the transmission line may be used for construction of the new transmission line. All material removed from the transmission line shall become the property of the contractor and disposal of such materials shall be made off the right-of-way.

All holes resulting from the removal operations shall be backfilled and the backfill shall be compacted. Additional material required for backfill shall be obtained by the contractor from any approved source. The backfill material in the top 8 inches of the holes shall be suitable for existing land users. Earth material that is loosened during the removal operation shall be compacted. All backfill shall be compacted to a dry density not less than the natural in-place dry density.

SECTION 2.2--CLEARING

2.2.1 GENERAL:

The item of the Schedule entitled "Clearing right-of-way" includes performing all work as described in this paragraph and the following two paragraphs.

The transmission line right-of-way is 150 feet wide, except at locations where guys and anchors require additional right-of-way. The contractor shall clear the area of the transmission line of all obstructions that will interfere with the construction or operation and maintenance of the transmission line. All clearing shall be performed in a manner that will minimize marring and scarring the countryside and that will preserve the natural beauty to the maximum extent possible.

The contractor shall not perform any clearing outside the limits of the right-of-way.

The word "trees" as used in these paragraphs shall include brush and shrubs. The words "shelter belt" as used in this paragraph shall include any grove of trees which has been purposely planted.

Excessive amounts of pine needles left by clearing of trees shall be removed from the right-of-way by the contractor and disposed of in a location to prevent any harm to grazing domestic animals.

Trees shall be trimmed or be removed only as necessary to clear for access roads, including roads through shelter belts which extend across the right-of-way; to provide land access to transmission structures; to maintain electrical clearances to conductors; and to prevent structure damage due to falling danger trees.

Trimming which would require removing the major portion of the foliage from an individual tree will be considered excessive trimming. Trees requiring excessive trimming to meet the requirements of these specifications shall be removed completely.

Trees which are removed shall be cut off as close to ground surface as possible, and in no instance shall they be cut at more than 3 inches above ground surface.

Operations for felling trees and for removal of felled trees shall be accomplished in a manner to protect and preserve trees which are designated to remain.

2.2.2 CLEARING CRITERIA:

a. CLEARING FOR ACCESS: Trees shall be cleared to the minimum extent required to provide suitable access for construction equipment. Trees to be removed in order to provide access within the limits of the right-of-way shall be cut off at the ground surface to permit vehicular travel. Stumps and root systems shall remain in the traveled surface unless otherwise designated to be removed by the Authorized Representative.

A 15-foot wide strip shall be cleared for access to structure sites which are in timbered areas.

b. CLEARING IN VICINITY OF STRUCTURES: Trees adjacent to any transmission line structure shall be removed to permit vehicular access to the structure and to minimize the possibility of structure damage due to falling trees. Tree removal shall not extend beyond a 20-foot radius from any transmission structure member, except for danger trees.

Danger trees are trees within the limits of the right-of-way which, upon falling will come within 10 feet of any structure member, including guys.

c. CLEARING FOR CONDUCTOR-TO-TREE CLEARANCE: Trees shall be removed to the extent necessary to provide 25 feet of vertical tree-to-conductor clearance under conductor sag conditions shown on the plan and profile drawings for a width of 28 feet on each side of the transmission line centerline. From this point to the right-of-way edge, the elevation at the top of the tree will be allowed to increase at the rate of 1 foot for each foot increase in distance from the transmission line centerline.

2.2.3 DISPOSAL OF CLEARED MATERIALS:

All cleared materials, except trees 3 inches in diameter and larger, shall be disposed of in accordance with the "Disposal of Waste Materials" paragraph of the "General Requirements" Division. Trees 3 inches in diameter and larger have commercial value and the contractor shall make every reasonable effort to channel these trees to beneficial use. Trees cut from private lands shall be disposed of by the contractor. Trees cut from Bureau of Land Management lands will be disposed of by the Bureau of Land Management. Trees that will be disposed of by the Bureau of Land Management shall be limbed, cut in 4-foot lengths, and stacked adjacent to an access road.

SECTION 2.3--SITE DRAINAGE

2.3.1 CORRUGATED METAL PIPE CULVERTS:

a. GENERAL: The items of the Schedule entitled "Corrugated metal pipe culverts, 24-inch diameter" and "Corrugated metal pipe culverts, 30-inch diameter" includes furnishing all materials and performing all work required for furnishing and installing the pipe culverts, including construction of access approaches to access across road ditches.

b. MATERIALS: Corrugated iron or steel pipe, including coupling bands, shall be in accordance with Federal Specification WW-P-405, 16-gage, Class I or II, Shape 1. The contractor, at his option, may furnish corrugated aluminum alloy pipe and coupling bands in lieu of corrugated-iron or steel pipe. Aluminum alloy pipe shall be in accordance with Federal Specification WW-P-402, Class I or II, Shape 1.

c. EXCAVATION: The ditches in which the corrugated metal-pipe culverts are to be laid shall be carefully finished to the existing ditch flow lines and grades so that the pipe will be fully supported at all points by un-excavated ground under the bottom quarter of the circumference.

If the character of the material at any point in the bottom of a corrugated metal-pipe culvert ditch is such as might cause unequal settlement or provide unequal bearing for the culvert, or is otherwise unsuitable for a foundation for the culvert, the unsatisfactory materials shall be removed to such depths as may be directed by the Authorized Representative. All additional excavation required on account of encountering unsuitable material in the bottom of culvert trench or ditch shall be backfilled and the backfill shall be compacted. The backfill material in the bottom of trenches where additional excavation has been required shall be carefully shaped to fit the curvature of the pipe under the bottom quarter of its

circumference. All additional excavation and placing and compacting backfill required on account of encountering unsuitable material in the bottom of culvert trench or ditch will be paid for in accordance with the "Changes" clause of the General Provisions.

Fill material shall not be obtained on the right-of-way but shall be obtained by the contractor from any approved source. Location, culvert size, and amount of fill are as follows:

Approximate Station	Culvert Size and Length	Approximate Depth of Fill
597+30	2-30"-25'	5'
680+50*	2-30"-25'	5' (Off ROW Access)
801+55	1-30"-25'	5'
3798+20	1-24"-25'	4'
7546+75	1-30"-25'	5'
8150+68	1-30"-25'	5'

*Left of centerline

d. COMPACTING EARTH MATERIALS:

(1) General: Where compacting of earth materials is required, the materials shall be deposited in horizontal layers and compacted as specified in this subparagraph.

The excavation, placing, moistening, and compacting operations shall be such that the material will be uniformly compacted throughout the required section and will be homogeneous, free of lenses, pockets, streaks, laminations, or other imperfections.

(2) Compacting Clayey and Silty Materials: Where compaction of earth materials containing appreciable amounts of clay or silt is required, the materials shall be deposited in horizontal layers. The thickness of each horizontal layer after compaction shall be not more than 6 inches.

The excavating and placing operations shall be such that the materials, when compacted, will be blended sufficiently to secure the highest practicable unit weight and best impermeability and stability.

Prior to and during compaction operations, the materials shall have a moisture content of not greater than 3 percent wet or less than 3 percent dry of optimum moisture, as determined by Western and the moisture content shall be uniform throughout each layer.

When the material has been conditioned as hereinbefore specified, it shall be compacted by rollers or by hand or power tampers. Where hand or power tampers are used to compact soils in confined areas such as under pipes and culverts, they shall be equipped with suitably shaped heads to obtain the required density.

The density (dry) of the soil fraction in the compacted material shall not be less than 92 percent of the laboratory standard maximum soil density (dry) as determined by the Bureau of Reclamation Proctor Compaction Test for the materials being compacted.

The Bureau of Reclamation Proctor Compaction Test will be made by Western. The standard maximum soil density is the dry weight per cubic foot of the soil compacted at optimum moisture content by laboratory procedure. The compaction test is the same as ASTM D 698, Method A, except that a 1/20-cubic-foot compaction mold is used and the rammer is dropped from a height of 18 inches, resulting in the same energy of compaction per unit volume.

(3) Compacting Cohesionless Materials: The thickness of the horizontal layers after compaction shall not be more than 6 inches if compaction is performed by tampers or rollers; not more than 12 inches if compaction is performed by treads of crawler-type tractors, surface vibrators, or similar equipment; and not more than the penetrating depth of the vibrator if compaction is performed by internal vibrators. Water shall be added to the materials as may be required to obtain the specified density by method of compaction being used.

The relative density of the compacted material shall be not less than 70 percent as determined by ASTM D 2049.

(4) Nuclear Density Gauges: At the option of Western nuclear density gauges may be used to determine the soil moisture content and degree of compaction.

e. HAULING AND HANDLING: The pipe shall be hauled and handled in such a manner as to avoid damage to the galvanized coating. The contractor shall not use cable or chain slings for handling the pipe.

Any damage to galvanized coating shall be repaired by applying two coats of zinc dust-zinc oxide paint conforming to Federal Specification TT-P-641, Type II. Any pipe unit that, in the opinion of the Authorized Representative is damaged beyond repair in hauling, handling, or otherwise, shall be replaced and removed from the site of the work.

f. LAYING: Corrugated metal pipe shall be laid to the finished lines and grades or depths established by the Authorized Representative. All fastenings shall be drawn up tight. Pipe shall be carefully placed so as to be fully supported at all points over the bottom quarter of the circumference. Coupling bands shall be used where necessary to join

sections of pipe. The coupling bands shall be installed property, in a manner to insure tight joints, with the joints between sections approximately at the center of the couplings.

As each unit of pipe is laid, sufficient backfill material shall be tamped about the pipe to hold it rigidly in place until the joints are completed. After the joints have been completed, backfill shall be placed and compacted. Equipment travel over the pipe will not be permitted until backfill has been placed and compacted to the depth recommended by the pipe manufacturer, but not less than 1 foot above the top of the pipe.

g. QUANTITIES AND PAYMENT: The length and diameter of each culvert shall be as specified above and payment will be made only on these lengths and diameters.

Where additional sizes are required by the Authorized Representative, payment for all additional materials shall be made in accordance with the "Changes" clause in the General Provisions.

SECTION 2.4--FENCING

2.4.1 CONSTRUCTING PERMANENT GATES IN EXISTING FENCES:

The items of the Schedule entitled "Barbed-wire gates on right-of-way", "Barbed-wire gates off right-of-way", and "Prefabricated steel gates" includes furnishing all materials, except gate closers for barbed-wire gates, and performing all work for constructing barbed-wire gates and installing prefabricated steel gates, respectively. Western will furnish gate closers for barbed-wire gates.

Where directed by the Authorized Representative, the contractor shall construct permanent gates in existing fences in accordance with the details shown on drawings 48 (41 9000), 49 (41 9002), and 50 (41 9020).

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DIVISON 3 - ELECTRICAL

SECTION 3.1--ELECTRICAL, GENERAL

3.1.1 GENERAL:

The contractor shall comply with safety requirements and with all other applicable requirements as specified under the "Safety and Health Requirements" Section of the "General Requirements" Division.

The work under these specifications shall be performed in a workmanlike manner and in accordance with the requirements of these specifications and the details shown on the drawings. Steps shall be taken to insure uniformity of assembly and construction.

The contractor's equipment and materials used to complete the installation shall be subject to the Authorized Representative's approval.

Some of the drawings included in these specifications are typical only and the contractor will not be entitled to any allowance above the prices bid in the Schedule by reason of any modification of a minor nature which may be required.

3.1.2 ITEMS REQUIRING SPECIAL ATTENTION:

Items requiring special attention include the bolts in line hardware and accessories and the sleeves in compression fittings. The contractor shall obtain installation instructions from the manufacturers of such items and shall furnish at least two copies of such instructions to the Authorized Representative. The contractor shall adhere to the following installation procedures:

a. The contractor shall use torque wrenches, or methods recommended by the manufacturer, to tighten bolts used with suspension clamps, vibration dampers, and jumper conductor connectors; and all such bolts shall be torqued to the manufacturer's recommended values. Western will make spot checks of bolt torques and, if deficiencies are found, the contractor shall retorque bolts to the extent deemed necessary by the Authorized Representative.

b. The contractor shall arrange for proper supervision of the installation of all compression fittings to insure that compression splices are centered, that the correct length of steel strand is inserted into the fitting, and that the steel sleeves of splices and dead ends are properly compressed onto the steel sleeves of splices and dead ends are properly compressed onto the steel strands. Where aluminum sleeves are used for conductor compression fittings, care shall be exercised to insure that compression deformations do not become sources of corona discharge. The Authorized Representative reserves the right to witness and approve the installation of all compression fittings and to reject any compression fitting which is installed without the Authorized Representative being present to witness the installing operation.

SECTION 3.2--WOOD-POLE STRUCTURES AND ACCESSORIES

3.2.1 GENERAL:

The items of the Schedule for the various types and lengths of wood-pole structures include the following:

a. Performing all earthwork for placing poles and anchors, including excavation, unwatering as needed, placing and compacting backfill, and other earthwork as required to complete installation of poles and anchors.

b. Drilling holes in rock for grounded anchors and furnishing grating materials and grouting anchor rods in place.

c. Furnishing all materials and performing all work for constructing the wood-pole structures, including installing the following materials, complete with associated hardware, in the quantities, listed for the respective structures on drawing 9 (FP-HV 6000):

(1) Poles, crossarms, x-braces, knee braces, and grounding materials.

(2) Pole bands.

(3) Overhead ground wire assemblies to structures and to overhead ground wire.

(4) Guy assemblies, exclusive of guy wire protectors. One guy, either single or double strand, shall include the length of guy strand and the clamps or alternate fittings for guy attachment as required to connect the guys to the pole bands and to the anchor rods. The contractor will not be entitled to extra compensation for constructing guys longer than shown on the drawings.

(5) Anchors, exclusive of bog shoes and bog anchors, but including concrete anchors, grouted anchors, copper-covered anchor rods, and anchor accessories.

d. Furnishing all materials and performing all work for installing two aerial patrol number signs on the first structure in each station mile and all structure number signs.

e. Furnishing the materials required, performing tests, and submitting test reports in accordance with the "Tests and Inspection" paragraph.

f. Furnishing all other materials and performing all other work required to complete the wood-pole structures and assemblies, except for guy protectors, bog shoes, and bog anchors.

The item of the Schedule entitled "Guy protectors" includes furnishing all materials and performing all work for installing guy protectors, complete with clips and other hardware required for installation.

The item of the Schedule entitled "Bog shoes" includes furnishing all materials and performing all work required for installing bog shoes on wood poles.

The item of the Schedule entitled "Bog anchors" includes furnishing all materials and performing all work required for installing bog anchors for wood-pole structures.

Conductor insulator assemblies are provided for in the "Conductor Insulator Assemblies" Section and are listed on drawing 9 (FP-HV 6000).

The contractor shall construct the wood-pole structures in accordance with these specifications and the details shown on the drawings.

3.2.2 MATERIALS:

a. WOOD-POLES: Wood poles shall conform to the following:

(1) Specifications and Dimensions: ANSI 05.1.

(2) Class: As specified in the bidding schedule.

(3) Specie: Pacific Coast Douglas Fir, Western Larch, Southern Yellow Pine, Ponderosa Pine, Lodgepole Pine, or Western Red Cedar.

(4) Treatment: Full length pressure treated in accordance with Federal Specification TT-W-571, except as follows:

(a) Minimum net retention of preservative by assay shall be in accordance with Federal Specification TT-W-571, Table 2, with the higher values provided for poles having more than 37 1/2-inch circumference at 6 feet from butt;

(b) Western Red Cedar poles may be full-length treated by thermal process per AWPA C8;

(c) Conditioning of Western Red Cedar, Ponderosa Pine, and Lodgepole Pine shall be by the air-seasoning process;

(d) Pentachlorophenol in volatile petroleum solvent per AWPA P9 may be substituted for pentachlorophenol in heavy petroleum solvent per AWPA P9.

(5) Storage and Handling: In accordance with ANSI 05.1, Paragraph 7. Tools producing a penetration of more than 1 inch shall not be used.

b. CROSSARMS: Crossarms shall be structural glued laminated timber with finished cross section of 3 1/8 inches by 9 inches. Manufacture of the crossarms shall be in accordance with AITC U.S. Commercial Standard CS253-63 and these specifications.

(1) Lumber: Lumber shall be coast region Douglas Fir, grown within the area as defined by WCLIB, Rule 16, Paragraph 154 and AITC PS 56-73, for structural laminations of Grades L1, L2, and L3. The lumber shall carry an inspection mark indicating the grade.

The laminating stock shall be nominal 2 inches in depth by 4 inches in width. The moisture content of each individual piece of lumber shall be within the range of 8 to 12 percent, inclusive, at the time of gluing. The moisture gradient in the lumber used in laminating shall be a mazimum of five percent between the core (one-half the depth) and 1/8-inch below the surface at mid-width. All lumber shall be free of visible compression wood or compression failure. The lumber shall be adequately protected in storage.

(2) Manufacture: The laminated crossarms shall be a combination of Grades L1, L2, and L3. The lamination layer sequence shall be L1, L2, L3, L2, and L1.

The outermost surface shall be limited to a single light shake or a single medium split in a twenty foot length. Lumber with wide ringed or lightweight pith-associated wood over 1/8 of its cross section shall be excluded from the outermost laminations representing five percent of the total depth of the column.

End joints of laminations shall be preglued and cured before face joint assembly in accordance with AITC PS 56-73. Unglued end joints are not permitted.

(3) Adhesives: Adhesives shall be waterproof and conform to the applicable requirement of Section 4.6 of AITC PS-56 to comply with wet and treated conditions of use. Wet-use adhesives conforming to ASTM D 2559 shall be used. Melamine urea adhesives shall not be used.

(4) Appearance: The appearance of members shall meet AITC 110 Industrial Appearance Grade. Top and bottom laminations shall be free of loose knots and open knot holes. Loose knots or knot holes shall drain water freely.

Edges shall be eased to 3/16-inch radius.

(5) Identification: Finished crossarms shall be marked with a quality mark indicating conformance with AITC Commercial Standard CS253-63, and permanently branded as to stress, grade, species, preservative, and year at time of treatment.

(6) Drilling: Crossarms shall be drilled before treatment in accordance with the "Crossarm Drilling Details", drawings 16 (41 6027) and 17 (41 6028).

(7) Treatment: The crossarms shall be incised and treated with pentachloraphenol in heavy petroleum solvent or pentachloraphenol in volatile petroleum solvent in accordance with AITC Treating Standard 109-79. The minimum net retention as determined by assay shall be 0.3 pound of pentachlorophenol per cubic foot.

c. X-BRACES AND KNEE BRACES: X-braces and knee braces shall be seasoned Pacific Coast Fir, cut from live timber, and shall be kiln-dried or air-seasoned in accordance with AWPA C25.

Knee braces shall be furnished complete with end fittings and with cross section and dimensions of spacing and drop as specified on the drawings.

X-braces shall be furnished complete with end fittings, bolts, washers, and center clamp as shown on drawing 18 (41 6029). The cross section of each x-brace shall not be less than 3 5/8 by 8 1/2 inches.

Braces shall be graded in accordance with paragraph 169-a of the WCLB; free of heart center (FOHC); surfaced four sides (S4S) after seasoning; and incised four sides to depth of 3/16 inch.

The X-braces and knee braces shall be treated with a preservative in accordance with C25 of AWPA. The preservative shall be a pentachlorophenol petroleum solution in accordance with AWPA P8 and P9. The minimum retention shall be 0.3 pound of pentachlorophenol per cubic foot. The penetration of the preservative shall be in accordance with AWPA C25 for a retention of 0.3 pound.

Structural glued laminated x-braces may be furnished in lieu of sawn x-braces provided that:

(1) The contractor submits data showing that the cross section of the laminated x-brace provides equal strength in compression, tension, and shear to that of the sawn x-braces.

(2) Except for dimensions, the lumber, treatment, appearance identification, and adhesives shall be in accordance with subparagraph b.(2) of this paragraph.

(3) The outer laminations shall be Grade L1.

d. STRUCTURE HARDWARE:

(1) Bolts, Nuts, Locknuts, and Lag Screws: All bolts and lag screws shall be made of steel conforming to Federal Specification FF-B-575, Type II, Grade 5 requirements. Locknuts and nuts shall conform to Federal Specification FF-N-836, Type I, Grade A. Unless otherwise specified, rolled or cut threads of the American Standard course-thread series shall be furnished on all bolts, nuts, and locknuts. The 7/8-inch double arming bolts shall be furnished with four square nuts and shall be threaded 6 inches at each end. The nuts and locknuts shall

run freely (hand fit) the entire length of the threads. Locknuts shall be "MF" type. Bolts used in insulator and overhead ground wire assemblies shall be furnished with hexagonal head, hexagonal nut, and cotter key and shall be made of a grade of steel commensurate with the ultimate strength specified for the hardware.

(2) H-frame Crossarm Fittings: The H-frame crossarm fittings shall be made of steel meeting the requirements for "Grade B" steel of Federal Specification QQ-S-741, and shall be in accordance with drawing 24 (41 6040), or adjustable spacer fittings equal to Hughes Brothers Catalog No. 3414. The plates shall show no defects after being bent. Each phase fitting shall support a minimum load of 4,000 pounds without evidence of distortion and shall have an ultimate strength of not less than 10,000 pounds.

(3) Twisted Shackles: The H-frame twisted shackles shall have an ultimate strength of not less than 20,000 pounds and shall be in accordance with drawing 24 (41 6040).

(4) Brackets: Each angle or extension bracket shall support a minimum load of 5,000 pounds without evidence of distortion and shall be in accordance with drawings 26 (41 6045) and 27 (41 6046).

(5) Parallel Groove Lamps for Structure Ground Wires: Parallel groove clamps for connecting cooperweld ground wires shall be made of copper alloy, smooth groove, with copper alloy bolts, and shall have not less than two bolts each.

(6) Staples: Staples shall be made of copperweld and shall have straight sides and cut or rolled points. The staples shall be not less than 1 3/4-inches long, shall be of wire not less than 0.144-inch diameter with an opening of 3/8 inch.

(7) Square Washers: Square washers shall be made of steel and shall have the dimensions specified on the drawings.

(8) Spring Lockwashers: The spring lockwashers shall be of steel stock as follows:

(a) 1/2-inch spring lockwashers shall be made of stock not less than 11/64 by 1/8 inch;

(b) 5/8-inch spring lockwashers shall be made of stock not less than 13/64 by 5/32 inch; and

(c) 3/4- and 7/8-inch spring lockwashers shall be made of stock not less than 1/4 by 3/16 inch.

(9) Structure Ground Wire: Structure ground wire shall be No. 2 AWG, 30 percent conductivity, annealed copperweld wire.

(10) Ground Rods: If alternate backfill as described in subparagraph (11) below is used, ground rods will be required for structure grounding. The ground rods shall be copper-covered steel of circular cross section 5/8-inch diameter and 8 feet long. The ground rods shall be equal to MacGraw-Edison Catalog No. DN3C8.

(11) Alternate Backfill: The contractor, at his option, may use "Poleset", as manufactured by Forward Enterprises of Texas, Inc., 9430 Telephone Road, Houston, Texas 77075, or equal, as backfill system. The system shall be capable of working in water and shall be in accordance with manufacturer's recommendations.

(12) Butt Plates: If alternate backfill as described in subparagraph (11) above is used, butt plates in lieu of ground rods may be used. The butt plates shall be solid copper, 14 inches in diameter. The butt plate shall be equal to Blackburn Catalog No. GP 1143.

(13) Structure Signs: Structure numbers shall be 3 inches high and shall be of aluminum, aluminum alloy, or stainless steel. The aerial patrol mile marker signs shall be in accordance with drawings 51 (41 9004) and 52 (41 9005).

Unless otherwise specified herein, all ferrous metal shall be galvanized in accordance with ASTM A 153. All metal shall be free from weld splatter and flux, burrs, sharp edges, and dross and shall be smooth so that interconnecting parts will fit properly. All bolts shall be galvanized after being threaded, and excess zinc shall be removed from the threads. All nuts and locknuts shall be tapped after being galvanized and shall be capable of being threaded the entire length of the threads without the use of a wrench.

All welding shall be performed by the electric-arc method, by a process which will exclude atmosphere from the molten metal. Welds shall be made as specified on the drawings and in accordance with the conventional welding symbols of AWS. All welding shall be done in accordance with the provisions of the "Structural Welding Code AWS D1.1," except that, when called for on the drawings or in these specifications, steel conforming to Federal Specification QQ-S-741 may be used in lieu of the steel called for in the code. The surfaces of finished beads and adjacent metal shall be thoroughly cleaned by sandblasting to such an extent that zinc coating, when applied, will adhere firmly, uniformly and permanently to the coated surfaces.

e. OVERHEAD GROUND WIRE ASSEMBLIES: The overhead ground wire assemblies shall be furnished in accordance with the drawings.

Turnbuckles may be used, at the contractor's option and at no additional cost to Western, as part of tension assemblies.

(1) Suspension Clamps: The suspension clamps shall be made of malleable iron or high-strength, drop-forged steel and shall be galvanized. The clamps shall be sized for use with 3/8-inch, 7-wire, steel-strand overhead ground wires without armor rods installed and shall be suitable for use on vertical line angles from 3° to a maximum of 35°. The suspension clamps shall have an ultimate strength of 15,000 pounds. The overhead ground wire supporting seat shall have sufficiently large longitudinal radii to prevent concentration of vibration bending and tension stresses at the overhead ground wire takeoff points. The centers of radii of the overhead ground wire seat shall be located on vertical lines extended below the clamp and no closer to the center of the clamp than the outside edges of the U-bolts. The clamp bore diameter for use with 3/8-inch overhead ground wire shall be 0.385 inch with a tolerance of plus 0.0 inch and minus 0.025 inch. Each clamp shall be complete with at least two U-bolts, keeper piece, a 5/8-inch-diameter bolt having a hexagonal head and provided with a hexagonal nut and with stainless steel self-locking-type cotter key. The unthreaded length of the bolt shall be adequate to insure free rotation of the bolt with the nut run onto the bolt to the limit permitted by the threaded portion of the bolt. The cable seat and keeper piece shall be smooth and free from burrs. Each suspension clamp assembly shall be capable of holding the overhead ground wire without slipping under an unbalanced tension of 4,000 pounds.

(2) Compression Dead Ends: The compression dead end assemblies for the overhead ground wires shall consist of a galvanized-steel eye and an aluminum sleeve or shall consist of a stainless steel sleeve connected to a galvanized-steel clevis with the clevis connected to a galvanized-steel eye. Each dead end assembly shall develop no less than 95 percent of the ultimate strength of the steel-strand overhead ground wire with which it is used.

(3) Assembly Coupling Hardware: Assembly coupling hardware shall be in accordance with subparagraph f. of the "Materials" paragraph in the "Conductor Insulator Assemblies" Section.

f. POLE BANDS:

(1) Pole Top Bands: Pole top bands for Type HSB structures shall be in accordance with drawing 22 (41 6033). Pole top bands for the center pole on Type 3AB structures shall be in accordance with drawing 21 (41 6032). Pole top bands for Type 3TA structures shall be in accordance with drawing 23 (41 6035).

The pole top bands and ground clips shall be made of steel which will meet the requirements of Grade B steel of Federal Specification QQ-S-741. The bands shall show no defects after being bent.

(2) Four-way Strain Bands, Connecting Links, and Ground Clips: The strain bands, connecting links, and ground clips shall be made of

steel which will meet the requirements for Grade B steel of Federal Specification QQ-S-741. The strain bands, connecting links, and ground clips shall be in accordance with drawings 19 (41 6030) and 20 (41 6031). The bands, including connecting links, shall have an ultimate strength of not less than 24,000 and 28,000 pounds for Type A and B bands, respectively.

g. GUY ANCHORS:

(1) Concrete Anchors: Concrete anchors shall be precast concrete anchors in accordance with drawing 30 (41 6049). The anchors shall withstand a tension of 29,000 pounds applied along the axis of the anchor rod.

In lieu of concrete anchors, the contractor may use power-installed screw anchors equal to those manufactured by A. B. Chance Company, provided that the installed anchor and anchor assembly will withstand a tension of 29,000 pounds applied along the axis of the anchor rod.

(2) Grouted Anchors: Grouted guy anchors shall be in accordance with drawing 31 (41 6050).

(3) Copper-Clad Anchor Rods: The anchor rods shall be copper-clad steel with a continuous copper covering molten welded to a steel core. The anchor rods shall be threaded at both ends and each shall be complete with nonferrous thimble- or twin-eye head for 7/16-inch-diameter galvanized-steel strand, one nonferrous washer and one bronze cap nut. The rods shall be 1-inch-diameter by 8 feet long. The rods, nuts, and washers shall be highly corrosion resistant when assembled and placed in the ground. The completed anchor rod assembly with anchor held immobile shall withstand a tension of 29,000 pounds applied to the thimble- or twin-eye along the axis of the anchor rod.

h. STRUCTURE GUYS:

(1) Guy Wire: The guy wire shall be 7-wire, 7/16-inch diameter, high-strength steel strand in accordance with ASTM A 475, Class A.

(2) Guy Attachment Hardware:

(a) Clamps: Clamps shall be of the three-bolt type using 5/8-inch bolts, and shall be of the heavy-duty, smooth-groove type, 6 inches long.

(b) Automatic Dead Ends: Automatic dead ends shall be spring-loaded vise type; shall consist of aluminum alloy tubes and yoke, plated cold-forged steel check, and stainless steel bails; and shall develop the full strength of the guy strand.

(3) Guy Sheave Wheels: Guy sheave wheels shall be made of steel which will meet the requirements for Grade B steel of Federal Specification QQ-S-741, or Class 65-35 steel casting of Federal Specification QQ-S-681. The sheave wheel shall have an outside diameter of 2 1/2 inches, with a 13/16-inch hole through the wheel.

(4) Guy-Wire Protectors: The protectors shall be made of metal of not less than 18-gage and shall be approximately 8 feet long. The protectors and all attachment parts shall be hot-dipped-galvanized, if made of steel. The protectors shall clamp to the cable at two or more places with U-bolts or other approved methods. The edges and corners of the protectors shall be smooth with no rough points, and the protectors shall be at least three-quarters round.

i. BOG SHOES AND BOG ANCHORS: Bog shoes and bog anchors shall be in accordance with drawing 37 (41 9019), except that anchor rods shall be 1-inch-diameter.

j. SPECIAL POLE FOUNDATIONS: The special pole foundations for structures shall be in accordance with drawing 28 (41 9014).

3.2.3 TESTS AND INSPECTION:

The materials and assemblies shall be subjected to the tests listed below. The contractor shall furnish all hardware, fittings, test apparatus, and instruments required; and shall complete the tests. The Authorized Representative reserves the right to witness all tests and to approve the manner in which the tests are conducted.

a. WOOD POLES:

(1) Inspection: The pole supplier shall lay out and turn poles as required for inspection by Western before and after treatment.

(2) Test of Materials: The contractor shall furnish two certified copies of records or results of tests as follows:

(a) Treatment record for each charge of pressure treated poles;

(b) Assay tests per number of borings required by AWPA-C4 for each charge using AWPA methods; and

(c) Penetration tests for each pole.

b. CROSSARMS, X-BRACES, AND KNEE BRACES:

(1) Inspection: Western reserves the right to inspect all crossarms, X-braces, and knee braces will be inspected by Western before and after treatment.

(2) Test of Materials: The contractor shall furnish two certified copies of records or results of tests as follows:

(a) Tests of moisture content of 10 crossarms, X-braces, and knee braces chosen at random from each lot of 500 crossarms, X-braces, and knee braces or less;

(b) The treatment record for each charge of pressure treated crossarms, X-braces, knee braces; and

(c) Penetration tests of 20 crossarms in each charge.

c. DEAD END ASSEMBLIES FOR OVERHEAD GROUND WIRES: Design tests shall be performed which show that compression dead ends develop not less than 95 percent of the ultimate strength of the overhead ground wire with which they are to be used.

d. SUBMITTALS: The contractor shall furnish test reports in accordance with the "Reports of Tests" paragraph.

Certified results of previous compression dead end design tests will be accepted as meeting the requirements of these specifications.

3.2.4 CONSTRUCTION, ASSEMBLY, AND INSTALLATION:

a. CONSTRUCTING WOOD-POLE STRUCTURES: The contractor shall furnish all materials and perform all work required to construct the structures. All nuts and locknuts used in the structures shall be tightened adequately but not excessively. The work shall include furnishing and installing structure materials in accordance with the following construction details.

(1) Poles: The contractor shall roof, gain, and bore the poles for all crossarms and braces. Unless otherwise approved, pole roofs shall be sloped toward or away from the center of the structures. The roofs and gains shall be impregnated and treated thoroughly by covering the exposed surfaces with at least two coats of hot preservative solution. One of the preservative solutions specified for pole treatment may be used for this purpose. Field-drilled holes in full-length treated poles shall be treated by approved means. All misdrilled holes shall be filled with treated plugs and redrilled. Gains for crossarms on poles having sweep or curvature shall be cut so that the crossarms will be mounted at right angles to the plane of the greatest curvature. After framing structures shall be blocked so no hardware contacts the grounds.

The poles shall be handled with care so as not to damage the wood or the preservative treatment. Poles shall not be handled with pole tongs. Cant hooks shall be handled so as to avoid tearing the wood. Poles shall not be dragged along the ground. If poles are stored after delivery, they shall be arranged with care and shall be placed so that no pole will come in contact with standing water or the ground. The poles shall be sorted and matched so that the poles in any one structure will be of like cross section, specie, and class. Except as otherwise provided or directed, all poles shall be set in accordance with Table 1 below.

TABLE 1

Length of Pole (feet)	Depths of Setting in Earth or Rock (feet)	Rake of Pole for Types 3A and 3AB Structures (5°-90° Line Angle) (inches)
60	8.0	15
65	8.5	16 and 1/2
70	9.0	17 and 1/2
75	9.5	19
80	10.0	20
85	10.5	21 and 1/2
90	11.0	22 and 1/2
95	11.5	23
100	12.0	24 and 1/2
105	12.5	25 and 1/2

Type 3TA structures shall be raked in accordance with requirements of drawing 36 (41 6055).

Poles requiring raking shall be raked the full length of the pole. Poles shall not be raked by use of guy wires.

Structure sites shall be graded as necessary for the structure installations and to insure that the incised area of pole butts of treated western red cedar poles will be at the ground level.

Poles in three-pole structures at angle and dead-end points and at other points of unbalanced stress shall be set 6 inches deeper than shown in Table 1, and poles with extra-large diameters shall be used at these points whenever possible. For two- or three-pole structures located on steeply sloping ground, longer poles shall be used on the lower sides and the depth of the holes, measured on the downhill sides, shall be at least as deep as shown in Table 1. Unless otherwise directed, all poles shall be set to within 3 inches of the specified setting. The tops of the poles in two-pole structures shall be at the same elevation.

All holes shall be dug in the correct locations and shall be large enough to provide space for use of tamping bars all around the poles to the full depth of the holes. The poles shall be carefully placed in the holes so that the structure grounding materials will not be damaged or displaced. Poles not required to be raked shall be set plumb and in alinement. Unless otherwise specified, structures at angles shall be set so as to bisect the angles. After the poles have been set and alined properly, the holes shall be backfilled.

Unless otherwise specified, holes dug for poles shall be backfilled with earth. The backfill in each hole shall be compacted to a dry density not less than the natural in-place dry density of the surrounding earth. The backfill shall be banked and tamped around the poles to a height of 12 inches above the natural ground surface. Any surplus excavated material shall be leveled neatly. If satisfactory backfill material is not available from excavation or within the immediate vicinity of the structure the contractor shall import any additional backfill material required.

All lag screws must be screwed in at least one-half the length of the screw.

If alternate backfill, as described in subparagraph d.(11) of the "Materials" paragraph is used, it shall be installed in accordance with the manufacturer's recommendations and shall be subject to approval by Western.

After framing of structures, all structures shall be blocked to prevent all galvanized material from contacting the soil.

(2) Crossarms: Crossarms shall be drilled, assembled, and attached in accordance with the crossarm drilling details and structure drawings. Where preassembled crossarms complete with phase fittings are furnished, bolt lengths of Parts 19.31 and 19.45 may be shorter than lengths specified on the drawings in order to facilitate shipment. If shorter bolts are furnished, they shall be of sufficient length to extend completely through nuts and locknuts.

(3) X-Braces: X-bracing of structures is required and shall be furnished and installed as a part of structures in accordance with the structure drawings and drawing 9 (FP-HV 6000).

(4) Knee Braces: Knee braces shall be installed as a part of each Type HSB structure.

(5) Structure Grounding: Structure grounding, including ground wire, shall be installed as shown on the drawings. Structure grounding is shown on drawing 46 (41 1012). The structure ground wire for pole-to-pole ties shall be buried at a minimum depth of 18 inches in uncultivated areas and 24 inches in cultivated areas. The ground wire shall not be spliced.

If alternate backfill is used, each pole shall have a coil of five wraps of structure ground wire stapled to the butt. Each pole shall have a ground rod set 18 inches from the pole with the upper end of the rod a minimum of 12 inches below grade, or a butt plate with a minimum 6 inches of common backfill before installation of alternate backfill. Each pole ground and ground rod or butt plate shall be tied together, with suitable materials a minimum of 12 inches below grade so as to form a continuous ground. The structure grounding shall be subject to approval by the Authorized Representative.

(6) Structure Numbers: The number of each structure, as designated on the plan-profile drawings, shall be attached with galvanized nails to the structure at approximately 10 feet above ground surface. The structure number shall consist of two numbers, one directly above the other. The upper number shall indicate the station mile and the lower number shall indicate the number of the structure within that station mile.

(7) Aerial Patrol Number Signs: The first structure of each mile section of line shall be identified with two aerial patrol mile number signs mounted in accordance with drawing 51 (41 9004).

(8) Miscellaneous Materials: Strand for pole-to-pole ties, hardware, brackets, fittings, angle irons for supporting overhead ground wires, and other miscellaneous materials shall be installed as required to complete the structure installations as shown on the structure drawings.

(9) Pole Bands: Pole top bands and four-way strain bands shall be installed as shown on the structure and guying drawings. Any ground clips, shackles for pole top bands, one or two connecting links for strain bands, as required, and all other hardware shown on the band drawings shall be furnished and installed as a part of the bands. The strain bands are designed to fit pole diameters in the 7.5- to 14.0-inch range and will be adequate when standard minimum poles are furnished. If strain bands are to be applied to pole diameters larger than 14 inches, the contractor shall furnish bands designed to fit the larger diameters without bending of the band bolts and without cutting of pole strain bands to fit pole diameters larger than 14 inches. These bands shall meet all requirements of the specifications, except for pole diameter range, and shall be furnished at no additional cost to Western. Bands shall be installed as follows:

(a) Pole Top Bands: Pole top bands, in accordance with drawing 22 (41 6033) and 23 (41 6035), shall be installed for overhead ground wire suspension assemblies where indicated on the structure drawings.

(b) Type A Four-Way Strain Bands: Type A four-way strain bands, in accordance with drawing 19 (41 6030), shall be installed for pole-to-pole ties, and for all overhead ground wire attachments and guys except where pole top bands are used for suspension assemblies.

(10) Overhead Ground Wire Assemblies: Assemblies used for overhead ground wires shall be suspension type for attachments to all Type 3A, 3AB, 3AC, and HSB structures and tension type for attachments to all other structures unless otherwise specified on the plan and profile drawings.

Each completed suspension assembly shall be installed on overhead ground wire and adjusted so as to hang in a vertical plane through the axis of the structures after the overhead ground wires are clipped in. The clipping in of overhead ground wires shall then be completed and all nuts tightened adequately.

The compression dead ends in tension assemblies shall be applied to the overhead ground wires in accordance with manufacturer's recommendations. The contractor shall furnish all necessary tools and joint-inhibitor compound.

Turnbuckles shall be initially installed such that not more than one-half of the allowable adjsutment in either direction is used.

The contractor shall obtain from the manufacturers, installation instructions required for proper assembly and installation of assemblies, and shall furnish two copies of such instructions to the Authorized Representative.

(11) Structure Guys: Structure guys shall be constructed where required by the drawings. As an alternate to guy attachments which use parallel groove clamps, the contractor may, at his option, use automatic springloaded vice-type guy attachments as shown on drawing 29 (41 6047). All guys shall be tightened to take out the slack in the guy strand, but the tension shall not be sufficient to cause noticeable deflection of poles.

Guy protectors shall be installed as directed in locations exposed to pedestrian traffic in towns or cities and adjacent to unfenced highways. Guy wire clips may be used for serving the ends of the guy strand provided they are installed by means of a tool designed for that purpose. In lieu of guy wire clips, the use of noncrimping-type or sleeve-type servicing device will be acceptable.

(12) Guy Anchors: Concrete anchors or screw anchors shall be used for anchoring in earth. Grouted anchors shall be used for anchoring in rock.

Placing a concrete anchor shall consist of excavating as required, installing anchor and anchor rod in position, backfilling, and compacting backfill. After the anchor and anchor rod have been set and aligned properly, the excavation made for anchor installations shall be back-filled with suitable material and thoroughly tamped in layers not more than 6 inches thick. The backfill shall be compacted to a dry density of not less than the natural in-place dry density of the surrounding earth. Any surplus excavated material shall be leveled neatly.

Placing the grouted anchor shall consist of drilling the required hole, installing the anchor rod in position, and grouting with grout of sand, cement, and water mixed in the proportions and to the consistency specified by the Authorized Representative.

(13) Bog Shoes: Bog shoes may be required in some areas where wet soils do not provide a suitable base to support poles. The Authorized Representative will determine where bog shoes are to be installed. The

bog shoes shall be constructed in accordance with drawing 37 (41 9019). The depth of pole setting required for poles equipped with bog shoes shall be the same as that specified for poles set in earth.

(14) Bog Anchors: Bog anchors may be required in some areas where wet soils do not provide a suitable base to support the anchors of subparagraph (12) above. The Authorized Representative will determine where bog anchors are to be installed. The bog anchors shall be constructed in accordance with drawing 37 (41 9019).

(15) Special Pole Foundations: Special pole foundations shall be installed, as directed by the Authorized Representative, for structures in accordance with drawing 28 (41 9014). Each foundation shall consist of two 36-inch diameter corrugated-metal pipes bolted together 6-inches below ground line and backfilled, as detailed on drawing 28 (41 9014).

SECTION 3.3--CONDUCTOR INSULATOR ASSEMBLIES

3.3.1 GENERAL:

The items of the Schedule for the various types of insulator assemblies for 954,000-circular mil, ACSR, 45/7 conductor include furnishing all materials and performing all work required for assembling and installing conductor insulator assemblies in accordance with the drawings and these specifications.

3.3.2 MATERIALS:

All materials to be used on the line end of insulator assemblies shall be protected during shipment and handling to prevent any damage that would become a source of corona discharge.

Turnbuckles may be used, at the contractor's option and at no additional cost to Western, as a part of other tension insulator assemblies.

a. PORCELAIN-TYPE INSULATORS: The insulators for conductor insulator assemblies for suspension angle and tension structures shall be of the cap-and-pin, ball-and-socket, radio-freed type. The insulator shells shall be made of wet-process porcelain. Toughened glass and other type construction is acceptable provided they meet all applicable requirements for porcelain insulators detailed herein. The insulator units shall meet the requirements of the latest ANSI C 29.2, except as otherwise specified in these paragraphs. The color of the glaze on all porcelain insulators shall be brown and all materials lists or purchase orders should clearly indicate this requirement.

The 20,000-pound strength insulators shall be the same as Class 52-3, except that the combined mechanical and electrical strength rating shall be 20,000 pounds. The 30,000-pound strength insulators shall be the same as Class 52-5, except that the combined mechanical and electrical strength rating shall be 30,000 pound.

Metal caps and pins of insulators shall be manufactured from metal exhibiting a yield strength to breaking strength ratio of not less than two-thirds. Cotter pins shall be made of stainless steel, shall be of the self-locking type, and shall have a spread of approximately 1 inch at the end of the legs.

b. LINE POST INSULATORS: Line post insulators shall be suitable for wood-pole mounting in accordance with drawing 14 (41 6018).

The insulators shall have a cantilever strength of 2,800 pounds, shall have a minimum positive impulse flashover value of 1025 kilovolts, and shall be Lapp Catalog No. 76074-A; or equal. The insulator shall be complete with aluminum conductor clamp for 954,000-circular mil ACSR conductor.

c. POLYMER-FIBERGLASS INSULATORS: The contractor may furnish polymer-fiberglass suspension-type, tension-type and post-type insulators in lieu of porcelain-type insulators, provided that the polymer-fiberlass insulators are equal to porcelain insulators, herein specified, in mechanical strength and electrical characteristics.

d. SUSPENSION CLAMPS: The suspension clamps for use with ACSR conductors shall be the sized type and shall be suitable for use directly on the conductors without armor rods. The design of the clamps shall be such that unit pressures on the conductor are maintained at levels which prevent damage to conductor strands under maximum loading conditions encountered on the line. The conductor supporting seat shall have sufficiently large longitudinal radii to prevent concentration of vibration bending and tension stresses at the conductor takeoff points. The centers of radii of the conductor seat shall be located on vertical lines extended below the clamp and no closer to the center of the clamp than the outside edges of the U-bolts. The clamp bore shall have a diameter equal to the nominal diameter of the conductor with which it is to be used with a tolerance of plus 0.1 inch. The radius of curvature of the clamp bore shall be maintained through an angle of 160° for the clamp body and of at least 140° for the clamp keeper piece. The clamp shall be designed for a maximum total vertical conductor angle of 30° (15° on each side).

The suspension clamps shall have no bolt ends projecting below the bottom of the clamp, shall have all surfaces smooth and free from burrs, and shall have all edges and fillets rounded to minimize field concentration and radio interference as required to meet the performance requirements for insulator assemblies as specified in these specifications. Each clamp shall be complete with at least two U-bolts, keeper piece, a bolt with diameter as stated below, having a hexagonal head and provided with hexagonal nut and with stainless steel self-locking-type cotter key. The unthreaded length of the bolt shall be adequate to insure free rotation of the bolt with the nut run onto the bolt to the limit permitted by the threaded portion of the bolt. Each suspension clamp shall be capable of holding the conductor without slipping under an unbalanced tension of

5,000 pounds. The clamps shall be the nonmagnetic type. Each suspension clamp shall be designed to limit magnetic losses to a maximum of 10 watts, with a 600-ampere, root mean square, 60-Hertz current flowing through the conductor.

Magnetic losses shall be determined by averaging the losses as determined from a simultaneous measurement on at least four clamps. If dissimilar metals are used in making up the clamp, suitable precautions shall be taken to minimize corrosion due to electrolytic action.

The minimum allowable ultimate strength for suspension clamps for use with the conductor shall be 25,000 pounds. Bolt diameter shall be 5/8 inch.

e. COMPRESSION DEAD ENDS: Compression dead ends shall be used. Each dead-end assembly shall include a hot-dipped galvanized-steel eye end, aluminum sleeve, jumper pad, and jumper connector of the compression type with bolted connection between the jumper connector and the jumper pad. Each dead end, when attached to the conductor, shall develop not less than 95 percent of the ultimate strength of the conductor and shall have a conductivity of not less than that of the conductor.

The angle between the dead-end bodies and the jumper connectors shall be approximately 60°. The dead ends and jumper connectors shall be protected during shipment to minimize damage that might serve as a point source for corona discharge. If such damage does occur, it shall be corrected by the contractor before installation.

f. ASSEMBLY COUPLING HARDWARE: Assembly coupling hardware shall have a rated ultimate strength of not less than 30,000 pounds. Each component part of coupling hardware used in the assemblies shall also be designed such that permanent deformation or yield does not occur at less than two-thirds of its rated ultimate strength.

Hardware shall have no sharp edges or projections and shall be of corona-free quality where necessary, shall be galvanized, and shall be complete with nuts, locking nuts, bolts, and self-locking stainless steel cotter keys.

All bolts, nuts, and locknuts shall be made of galvanized steel. The bolts shall meet or exceed the requirements of FF-B-575, Type II, Grade 5, and shall be made of a grade of steel commensurate with the ultimate strength specified for the hardware.

Unless otherwise specified, all ferrous metal shall be galvanized in accordance with ASTM A 153. All metal shall be free from burrs, sharp edges, lumps, and dross, and shall be smooth so that interconnecting parts will fit properly and so that the parts may be assembled and disassembled readily. All threaded parts shall be galvanized after being threaded and excessive zinc shall be removed from the threads. All nuts and locknuts shall be retapped after being galvanized and shall be capable of being threaded the entire length of the threads without the use of a wrench.

3.3.3 TESTS:

All insulator assemblies shall be subjected to the applicable tests required by this paragraph. The contractor shall furnish all insulators, hardware, fittings, test apparatus, and instruments required; and shall complete the tests. The Authorized Representative reserves the right to witness all tests and to approve the manner in which the tests are conducted.

a. SUSPENSION INSULATOR UNITS: Each class of suspension-type insulator units shall be tested in accordance with all the requirements of the latest edition of ANSI C 29.2 for the mechanical and electrical strength ratings required under these specifications.

b. LINE POST INSULATORS: Post-type insulators shall be tested in accordance with ANSI C 29.7.

c. POLYMER-FIBERGLASS INSULATOR TESTS: The contractor shall perform tests to verify that the polymer-fiberglass insulators meet the minimum requirements of the "Materials" paragraph.

d. COMPRESSION DEAD ENDS FOR CONDUCTOR: Design tests shall be performed which show that compression dead ends develop not less than 95 percent of the ultimate strength of the conductor with which they are to be used.

3.3.4 SUBMITTALS:

a. GENERAL: The contractor shall furnish drawings, data, and test reports in accordance with the "Drawings and Data" and "Reports of Tests" paragraphs.

b. REPORTS OF TESTS: The contractor shall furnish certified reports of results of tests performed as follows:

(1) Suspension Insulator Units:

(a) Design Tests:

(aa) Critical Impulse Flashover Tests: ANSI C 29.2, paragraph 8.2.3.

(bb) Time-Loading Test: ANSI C 29.2, paragraph 8.2.5.

(cc) Residual-Strength Test: ANSI C 29.2, paragraph 8.2.7.

(b) Quality Conformance Tests:

(aa) Combined Mechanical and Electrical Strength Tests: ANSI C 29.2, paragraph 8.3.4.

(c) Routine Tests:

(aa) Tension-Proof Tests: ANSI C 29.2, paragraph 8.4.3.

(2) Line Post Insulators:

(a) Design Tests:

(aa) Critical Impulse Flashover Tests: ANSI C 29.7, paragraph 8.2.3.

(b) Quality Conformance Tests:

(aa) Cantilever-Strength Tests: ANSI C 29.7, paragraph 8.3.4.

(c) Routine Tests:

(aa) Routine Cantilever Tests: ANSI C 29.7, paragraph 8.4.2.

(3) Polymer-Fiberglass Insulators: The polymer-fiberglass insulators shall be tested, and certification submitted to Western, demonstrating that the insulators meet or exceed the mechanical and electrical strengths required for porcelain-type units specified in this specification.

(4) Compression Dead Ends: Subparagraph d.(11) of the "Materials" paragraph.

c. Certified reports of results of previous design tests made on insulators and compression dead ends identical to those required under these specifications will be accepted as meeting the test requirements of these specifications.

3.3.5 INSTALLATION:

The contractor shall furnish all materials, assemble, and install conductor insulator assemblies as shown on drawings 38 (41 1000), 40 (41 1002), and 41 (41 1003), and as shown on the structure drawings.

Where practical, the nuts and cotter keys used in assemblies shall be faced in toward the structure to facilitate removal during hot line maintenance. This does not apply to the cotter keys in the individual insulator units.

Each completed suspension insulator string shall be installed on the conductor and adjusted so as to hang in a vertical plane through the axis of the structures after the conductors are clipped in. The clipping in of conductors shall then be completed and all nuts adequately tightened.

The compression dead ends and jumper connectors in tension assemblies shall be applied to the conductor in accordance with the manufacturer's recommendation. The contractor shall furnish all necessary tools and joint-inhibitor compound.

Jumper terminal connectors shall be attached to the line side of dead end terminal pads and the jumper terminal bolts shall be inserted from the line end toward the tower end of the assembly where such installation will minimize corona onset and radio-influence voltages.

Turnbuckles shall be initially installed such that not more than one-half of the allowable adjustment in either direciton is used.

The contractor shall obtain from manufacturers the installation instructions required for proper assembly and installation of insulator assemblies, and shall furnish two copies of such instructions to the Authorized Representative.

SECTION 3.4--CONDUCTOR, OVERHEAD GROUND WIRE, AND ACCESSORIES

3.4.1 CONDUCTORS:

a. GENERAL: The item of the Schedule entitled "Stringing three 954,000-circular mil, ACSR, 45/7, nonspecular conductors" includes furnishing all materials and performing all work required to install all materials including conductor, conductor joints, conductor repair sleeves, and inhibtor compound, to complete the conductor installation.

Measurement for furnishing and stringing the conductors will be made horizontally along the centerline of the transmission line.

b. MATERIALS:

(1) Conductor: The conductor shall be ACSR, and shall conform to the requirements of ASTM B 232, and Table 2 "Special Characteristics."

Table 2

SPECIAL CHARACTERISTICS		
Completed conductor size (circular mil)	954,000	
Ultimate strength, as computed for the strength of the individual strands, not less than (pounds)	25,900	
Aluminum strands:		
Number		45
Diameter (inches)		0.1456
Steel strands:		
Number		7
Diameter (inches)		0.0971
*Standard lengths of conductor on each reel (feet)	9,990	
Random lengths, for a maximum of 10 percent of total amount furnished, not less than (feet)	3,335	

*Allowable minus tolerance 5 percent; no upper limit on length.

(a) General Characteristics: Each individual wire entering into the construction of the completed conductor shall conform to ASTM B 230. The core wire shall be Class A, galvanized-steel wire conforming to ASTM B 498 and B 500.

(b) The conductor shall be nonspecular type having the outer surface treated to produce a dull finish.

(c) Raised Strand Limitation: The conductor shall be designed and fabricated to insure that all strands in the outer layer will remain the same distance (within a plus tolerance of 25 mils) from the center of the conductors before and after the conductors are strung.

(d) Packing and Shipping: The completed conductor shall be furnished on reels sufficiently sturdy in construction to withstand any normal service incident to shippng, hauling, and field erection of conductor. No random length shall be wound on the same reel with a specified standard length, and all reels on which random lengths are furnished shall be of the same overall width and shall have bushings of the same inside sleeve diameters as the reels for the specified standard conductor lengths.

(2) Conductor Joints and Repair Sleeves: The joints for splicing conductor shall be compression-type, shall include an overall aluminum alloy sleeve, and shall develop not less than 95 percent of the ultimate strength of the conductor. The conductivity of the completed splices shall be not less than that of the conductor.

Compression repair sleeves may be used in lieu of compression joints to repair minor damage to conductor, provided that not more than one-third of the aluminum strands in the outer layer are damaged over a length of not more than 4 inches and the cross-sectional area of any damaged strand is not reduced by more than 25 percent, that there are no broken strands, and that there has been no damage to strands in other layers.

c. TESTS:

(1) Conductor Tests: During fabrication of the conductor, all physical tests shall be made in accordance with the requirements of ASTM.

In the event that the conductor is fabricated by two or more manufacturers, all tests shall be performed by each manufacturer.

d. SUBMITTALS: The contractor shall submit data and the results of required tests in accordance with the "Drawings, Data, and Test Reports" Section.

e. INSTALLATION: The contractor's equipment and methods used for stringing conductors shall be subject to approval of Western and shall be such that conductors will not be scratched, grooved, kinked, twisted, abraded, or otherwise deformed and such that support structures will not be damaged. If the conductors are damaged, the contractor shall repair or replace the damaged sections in a manner approved by the Authorized Representative and at no additional cost to Western. All sections of conductors damaged by the application of gripping attachments shall be repaired or replaced before the conductors are sagged in place.

No stringing operations shall be conducted over any roadway on Saturdays, Sundays, or legal holidays without prior approval of the Authorized Representative.

All stringing operations shall be conducted so that at no time will any suspension attachment be subjected to longitudinal loads, and at no time will any tension tower by subjected to torsion resulting from longitudinal loads on opposing faces at opposite ends of crossarms. The vertical angles of pulling lines shall be such as to minimize, within practical limits, the vertical loading in structures and shall be subject to approval of the Authorized Representative.

Procedures used for stringing and sagging conductors, including special safety precautions when stringing adjacent to energized facilities and at powerline crossings, shall meet the minimum requirements set forth in the "Safety and Health Requirements" Section of the "General Requirements" Division.

Portions of the transmission line will closely parallel existing energized transmission lines. During stringing operations a buildup of voltage due to energized parallel facilities may reuslt in safety hazards. The contractor shall be responsible for familiarizing himself with the area and shall implement adequate safety measures when stringing conductors adjacent to energized facilities, particularly those located within 2 miles of the transmission line.

The conductors shall be strung by the controlled-tension method, except in certain isolated spans upon approval from Authorized Representative, using neoprene-line, double-bull-wheel-type tension stringing equipment.

The pulling lines shall be of sufficient length to avoid applying undue strain to the insulators and structures, and shall be connected to the conductors with swivel connectors and stocking-type grips as directed by the Authorized Representative. The end of the grips (sock) shall be taped to the conductor so that the grips will run freely in the sheaves. Conductor splices shall not be passed through a sheave except as specifically permitted by the Authorized Representative. Reel strands shall be heavily constructed and provision shall be made for braking the reels. The conductor shall not be dragged over ground, rock, or fence wires, nor over any object which may damage the conductor. Suitable guards or sheaves shall be used to protect the conductor from damage in places where it would otherwise be impossible to keep the conductor from coming in contact with objects which may injure the conductor. Guards shall consist of material over which the conductor may slide without injury and shall be subject to the approval of the Authorized Representative.

The design, size, materials, and points of attachment of the stringing sheaves, and vertical angles of running lines shall be subject to approval of Western. The minimum diameter of the sheaves at the bottom of the groove shall be at least 12 times the diameter of the conductor with

which it is used, and the size and shape of the groove shall conform to the conductor manufacturer's recommendation. Sheaves shall be equipped with high-quality ball or roller bearings and shall have neoprene-lined grooves. The conductors shall not be allowed to hang in the stringing blocks more than 24 hours before being pulled to the specified sag. After being sagged, the conductors shall be allowed to hang in the stringing blocks for not less than 2 hours before being clipped in, to permit the conductor tension to equalize. The total time which the conductors are allowed to remain in the stringing blocks before being clipped in shall not be more than 72 hours. Notwithstanding the 72-hour limitation, pulling of any third conductor setup will not be allowed until the corresponding first conductor setup is clipped in.

In order to minimize the danger of failure, the design of the tension equipment shall be such that when the desired tension is obtained, the same constant tension will be held so long as the brakes are left at this setting, whether the brakes are actuated manually, pneumatically, hydraulically, or electrically. The equipment shall be so designed that there can be no conduction of heat generated by the braking action of the bull wheels. There shall be slight mechanical braking on the reels to prevent loose conductor between the reels and the bull wheels. The bull wheels shall have a neoprene lining not less than 1/4-inch-thick and shall have a minimum outside diameter of 42 inches.

A minimum of 4 1/2 turns of conductor shall be placed around the bull wheels. The equipment shall be capable of maintaining a continuous tension of 6,400 pounds per conductor. When stringing conductors by the controlled-tension method, the sag in each conductor shall be maintained at least 20 percent greater than the sags specified in the stringing sag tables, prior to final adjustment of the sag before clipping in the conductors.

The conductors shall not be prestretched and shall be sagged in accordance with sag tables which will be furnished to the contractor after notice to proceed has been issued. The length of conductor sagged in one operation shall be limited to the length that can be sagged satisfactorily but shall not exceed 16,000 feet. In sagging one-reel lengths, the sag of two spans shall be checked. In sagging lengths of more than one reel, the sag of three or more spans near each end and the middle of the length being sagged shall be checked. The length of the spans used for checking shall be approximately equal to the ruling span. All spans which exceed 950 feet shall be checked for sag; and, at sharp vertical angles, the sag shall be checked on both sides of the angle. The sag of spans on both sides of all horizontal angles of more than 10° shall be checked. After the conductors have been pulled to the required sag, intermediate spans shall be inspected to determine whether the sags are uniform and correct.

Sagging operations shall not be carried on when, in the opinion of the Authorized Representative, wind, extremely low temperature, or other adverse weather conditions prevent satisfactory sagging. A tolerance of plus or minus 1/2 inch sag per 100 feet of span length, but not to exceed 6 inches in any one span, will be permitted when stringing is being done at temperatures of 0°F and above, and a tolerance of plus or minus 1/4 inch of sag per 100 feet of span length, but not to exceed 3 inches in any one span, will be permitted when stringing is being done at temperatures below 0°F; provided, that all conductors in the span assume the same sag or are within one conductor diameter of each other and the necessary ground clearance is obtained; provided further, that the conductor tension between successive sagging operations is equalized so that the suspension insulator assemblies will assume the proper position when the conductor is clipped-in. After clipping-in is completed, all suspension insulator strings shall hang vertically. Each phase of conductor shall be tied off, both ahead and back, at the last clipped structure of each sag setup, which tie-offs shall be left in place until the tie-offs of the subsequent setup are in place. The contractor shall check the sag at all points to be checked. The contractor shall furnish the necessary personnel for signaling and climbing purposes. The contractor shall target all spans for sagging and Western may verify the sag at any point with the contractor's equipment. At all suspension or tension structures, the conductors shall be attached to the insulator assemblies by suspension clamps or dead-end fittings, in accordance with the "Conductor Insulator Assemblies" Section. Conductor arrangements throughout the line shall be as shown on the plan-profile sheets or as specified by the Authorized Representative.

During the stringing operations, dirt or grease that can be readily observed on the conductors shall be removed by cleaning with clean cloths or brushes saturated with tetrachlorethylene or trichlorethylene. Proper precautions shall be taken by personnel cleaning the conductor to protect themselves against the toxic and drying acitons of the chemical being used. The cleaning apparatus itself shall be kept clean such that particles collected during the conductor cleaning process do not scratch or mar subsequent conductor.

If necessary, insulator offset data shall be used so as to insure that suspension insulator strings hang in a vertical plane throught the axis of the structure after the conductors are clipped-in. The contractor shall submit, for information, computed offset data at least 2 weeks prior to stringing of each section of line for which offset data are required. The data shall include the beginning and ending stations for each continuous seciton to be strung.

All joints and repair sleeves shall be located at least 25 feet away from the structures. No joints or repair sleeves shall be used in spans crossing over interstate highways, railroads, communications lines, or utility line of voltages greater than 15 kilovolts, or in the two spans

adjoining the crossing span, without approval of the Authorized Representative. To develop rated mechanical strength and electrical conductivity, the installation of compression joints shall be carefully supervised to insure that the joints are centered properly. The distance between two joints, betweeen two repair sleeves, or between a joint and a repair sleeve on any one conductor shall be not less than 4,000 feet. Not more than one joint or repair sleeve will be permitted in any one conductor in any one span.

Conductor dead ends, joints, and repair sleeves shall be applied to conductors in accordance with the manufacturer's recommendations. The contractor shall furnish filler paste and all necessary tools, including compressors required for applying compression splices and compression-type dead ends.

Jumper connections shall be made with compression-type jumper terminals which shall be bolted to the compression-type dead ends. After the splices, dead ends, and jumper connects are compressed onto the conductor, the contractor shall remove, by suitable mean, any sharp edges or protrusions formed during the compression operations.

3.4.2 OVERHEAD GROUND WIRE:

a. GENERAL: The item of the Schedule entitled "Stringing two 3/8-inch diameter, high-strength steel, 7-strand overhead ground wires" includes furnishing all materials and performing all work to install all materials for overhead ground wires, including the galvanized-steel strand wire and wire joints required to complete the overhead ground wire installation.

The special safety precautions during stringing near energized lines and the equipment methods and limitations used in stringing overhead ground wires shall be the same as those used in stringing conductors as described in the "Conductors" paragraph.

The item of the Schedule for stringing two 3/8-inch-diameter galvanized high-strength steel, 7-strand overhead ground wires includes furnishing, stringing, splicing, sagging, and clipping in the overhead ground wires, as described in this paragraph; and furnishing and installing all materials to complete the overhead ground wire installations, except for materials furnished and installed as a part of suspension and tension assemblies for overhead ground wires. The overhead ground wire assemblies are provided for in the "Wood-Pole Structures and Accessories" Section.

Measurement for furnishing and stringing the overhead ground wires will be made horizontally along the centerline of the transmission line.

b. MATERIALS:

(1) Overhead Ground Wires: The overhead ground wires shall be 7-wire, 3/8-inch-diameter, galvanized-steel strand conforming to high-strength grade, Class B steel in accordance with ASTM A 363.

The completed strand shall be furnished on reels sufficiently sturdy to withstand normal service incident to shipping, hauling, and field erection. The 3/8-inch-diameter strand shall be furnished in lengths not less than 5,000 feet long, except that not more than 5 percent of the total length may be furnished in lengths of not less han 2,500 feet.

(2) Overhead Ground Wire Joints: Joints used for splicing or repairing damaged overhead ground wire shall be compression-type, full tension joints. Use of repair sleeves is not permitted.

c. TESTS: All tests enumerated in ASTM A 363 shall be performed on samples taken at random from 10 percent of the reels of the completed galvanized-steel wire.

d. SUBMITTALS: The contractor shall furnish data and test reports in accordance with the "Reports of Tests" paragraph.

e. STRINGING: The overhead ground wires shall be strung in accordance with conductor stringing requirements of the "Conductors" paragraph, except that neoprene-lined or unlined sheaves may be used. Sheaves shall be at least 7 inches in diameter at the bottom of the groove.

3.4.3 VIBRATION DAMPERS:

a. GENERAL: The item of the Schedule entitled "Attaching stockbridge-type vibration dampers directly to 954,000-circular mil, ACSR, conductors" includes furnishing all materials and performing all work required to install stockbridge-type vibration dampers for the ACSR conductors.

The item of the Schedule entitled "Attaching vibration dampers directly to 3/8-inch, high strength, 7-strand overhead ground wire" includes furnishing all materials and performing all work required to install vibration dampers for the overhead ground wires.

The contractor will have the option of furnishing stockbridge-type or preformed spiral vibration dampers as manufactured by Preformed Line Products Company, P.O. Box 91129, Cleveland, OH 44101, Catalog Number SVD0104 or equal for the steel strand overhead ground wires.

b. MATERIALS: Stockbridge type vibration dampers shall have an aluminum clamp compressed or cast onto the messenger wire between the weights provided that the casting process, if used, shall meet or exceed the requirements of Federal Specification FF-B-575, Type II, Grade 5. All ferrous metal shall be galvanized in accordance with ASTM A 153. All metal shall be free from burrs, sharp edges, lumps, or dross, and shall be smooth so that interconnecting parts will fit properly and so that the parts may be assembled and disassembled readily. All threaded steel parts shall be galvanized after being threaded and excessive zinc shall be

removed from the threads. The dampers shall be suitable for installation directly on the conductors or the overhead ground wires as applicable as armor rods will not be used.

The damper clamp shall be designed to permit installation and removal by the use of hot-line tools.

c. TESTS:

(1) Aeolian Vibration Tests: Tests which demonstrate the effectiveness of vibration dampers in limiting the peak-to-peak bending amplitude, caused by aeolian vibration and as defined in the IEEE Task Force on Conductor Vibration (IEEE Paper No. 31 CP 65-156), to 10 mils for ACSR conductors and to 15 mils for steel-strand overhead ground wire shall be performed.

The tests shall be performed in suspension spans of the 600- to 900-foot length range with cable tensions not less than 20 percent of the cable nominal ultimate strengths and with vibration dampers installed at the manufacturer's recommended spacing, for each of the following cable sizes:

(a) ACSR conductor with diameter of 1.165 inches plus or minus 0.25 inch.

(b) Steel strand with diameter of 0.36-inch plus or minus 1/16 inch.

The test for each cable size shall be continued for a minimum of 3 weeks or until a full range of winds between 0 and 20 miles per hour and at right angles to the line have been recorded.

Laboratory tests which are equivalent to the above tests may be performed at the option of the contractor.

d. SUBMITTALS: The contractor shall submit data and results of the required tests in accordance with the "Drawing and Data" Section. Additionally, the contractor shall obtain from the manufacturer, the vibration damper spacing that the manufacturer has determined from tests to be most effective in limiting bending amplitudes in accordance with subparagraph c.(1) above and for all the applications listed on drawing 8 (FP-HV 1002), and shall submit that data to Western.

Certified reports showing results of previous tests which show that vibration dampers meet the requirements of these specifications may be substituted for the test results required above.

e. INSTALLATION: Vibration dampers shall be attached to conductors and to overhead ground wires as directed. Data showing spacing requirements will be furnished to the contractor after the contractor furnishes the damper manufacturer's recommendation to the Authorized Representative. The vibration dampers shall be fastened securely to the conductors and overhead ground wires in accordance with the manufacturer's instructions. All components shall be properly aligned and the installation completed with torque wrenches to insure that bolts are tightened to the torque values recommended by the manufacturer. Western will make spot checks of vibration damper installations, and if deficiencies are found, the contractor shall correct the damper installations to the extent deemed necessary by the Authorized Representative.

The contractor shall hang the stockbridge-type vibration dmapers in a vertical plane and shall ascertain that any drain holes provided in damper weights are open after the dampers are installed. The vibration dampers for conductors shall be installed so that the head of the clamp bolt faces toward the structure to facilitate removal during hot-line maintenance.

SECTION 3.5--FENCE GROUNDS

3.5.1 FENCE GROUNDS

a. GENERAL: The item of the Schedule entitled "Fence grounds for non-electric fences" includes furnishing all materials, including grounding rods, and performing all work described in this paragraph.

The contractor shall furnish and install all the grounding materials and shall ground all fences of metallic material which cross under the transmission line or which are located in the proximity of and parallel to the transmission line as described below except for locations at which fence grounds have been previously furnished and installed by others.

Nonelectric fences which are constructed on wood or concrete posts shall be grounded with one grounding rod at the hinge end of each gate, and one grounding rod for each 1/8 mile of the fences that are parallel to and within 75 feet of the centerline of the transmission line. One grounding rod shall be used on each side of the right-of-way to ground fences crossing under the line.

Nonelectric fences which are constructed on metal posts, either driven or set in concrete shall be grounded with one grounding rod for each 1/4 mile of the fences that are parallel to and within 75 feet of the centerline of the transmission line. One grounding rod shall be used on each side of the right-of-way to ground fences crossing under the line.

All metallic gates within the right-of-way shall be bonded electrically to the fences.

b. MATERIALS: Materials utilized in grounding fences shall be in accordance with drawing 47 (41 1011).

c. INSTALLATION: Fence grounds shall be installed in accordance with drawing 47 (41 1011). Grounding rods shall be driven to a depth of not less than 5 feet. The fence wires shall be fastened securely to the grounding rods by U-bolt clamps.

SECTION 3.6--HOLD-DOWN WEIGHTS

3.6.1 HOLD-DOWN WEIGHTS:

a. GENERAL: The item of the Schedule entitled "Hold-down weights, 100-pound" includes furnishing all materials and performing all work required to install hold-down weights in accordance with the plan and profile drawings and these specifications.

b. MATERIALS: The hold-down weights shall be 100-pound weights suitable for attaching directly to 954,000-circular mil, ACSR, 45/7 conductor without armor rods. The weights shall be lead conductor weights as manufactured by NH Industries, Inc., P.O. Box 26141, Denver, CO 80226; or equal.

c. INSTALLATION: The hold-down weights shall be assembled and installed in accordance with the manufacturer's recommendations and the plan and profile drawings.

SECTION 3.7--APPROACH SPANS

3.7.1 FORT PECK, RICHARDSON COULEE, MALTA, HARLEM, AND HAVRE SUBSTATIONS TAKE-OFF STRUCTURES:

a. GENERAL: The contractor shall furnish and install all materials necessary to complete installation of conductors and overhead ground wires to the take-off structures at Fort Peck, Richardson Coulee, Malta, Harlem, and Havre Substations.

b. MATERIALS AND INSTALLATION: Material for use on the take-off structures shall be in accordance with the requirements for indentical materials as specified elsewhere in these specifications.

c. The contractor shall furnish and install all materials required to complete the approach spans at the following take-off structures.

(1) Fort Peck Take-Off Structure:

(a) Three single-string conductor tension insulator assemblies as shown on drawing 39 (41 1001) with 15 insulator units each. The

insulator units shall be 20,000-pound-strength in accordance with the paragraph entitled "Conductor Insulator Assemblies". The assemblies shall be complete with all hardware, turnbuckles, and compression dead ends for 954,000-circular mil conductor.

(b) Two overhead ground wire tension assemblies, with turnbuckles, isolating insulators, and all hardware and compression-type dead ends for 3/8-inch high-strength overhead ground wire, as shown on drawing 44 (41 1006).

(c) Sufficient joint sealing compound to be used with compression dead ends furnished.

(2) Richardson Coulee Take-Off Structures:

(a) Six single-string conductor tension insulator assemblies as shown on drawing 39 (41 1001) with 15 insulator units each. The insulator units shall be 20,000-pound-strength in accordance with the paragraph entitled "Conductor Insulator Assemblies". The assemblies shall be complete with all hardware, turnbuckles, and compression dead ends for 954,000-circular mil conductor.

(b) Four overhead ground wire tension assemblies, with turnbuckles, isolating insulators, and all hardware and compression-type dead ends for 3/8-inch high-strength overhead ground wire, as shown on drawing 44 (41 1006).

(c) Sufficient joint sealing compound to be used with compression dead ends furnished.

(3) Malta Take-Off Structures:

(a) Six single-string conductor tension insulator assemblies as shown on drawing 39 (41 1001) with 15 insulator units each. The insulator units shall be 20,000-pound-strength in accordance with the paragraph entitled "Conductor Insulator Assemblies". The assemblies shall be complete with all hardware, turnbuckles, and compression dead ends for 954,000-circular mil conductor.

(b) Sufficient joint sealing compound to be used with compression dead ends furnished.

(4) Harlem Take-Off Structures:

(a) Six single-string conductor tension insulator assemblies as shown on drawing 39 (41 1001) with 15 insulator units each. The insulator units shall be 20,000-pound-strength in accordance with the paragraph entitled "Conductor Insulator Assemblies". The assemblies shall be complete with all hardware, turnbuckles, and compression dead ends for 954,000-circular mil conductor.

(b) Sufficient joint sealing compound to be used with compression dead ends furnished.

(5) Havre Take-Off Structure:

(a) Three single-string conductor tension insulator assemblies as shown on drawing 39 (41 1001) with 15 insulator units each. The insulator units shall be 20,000-pound-strength in accordance with the paragraph entitled "Conductor Insulator Assemblies". The assemblies shall be complete with all hardware, turnbuckles, and compression dead ends for 954,000-circular mil conductor.

(b) Two overhead ground wire tension assemblies, with turnbuckles, isolating insulators, and all hardware and compression-type dead ends for 3/8-inch high-strength overhead ground wire, as shown on drawing 44 (41 1006).

(c) Sufficient joint sealing compound to be used with compression dead ends furnished.

SECTION 3.8--DRAWINGS, DATA, AND TEST REPORTS

3.8.1 DRAWINGS AND DATA:

As soon as practicable after award of contract, the contractor shall furnish to the Western Area Power Administration, P.O. Box 3402, Golden, Colorado 80401, Attention: Code A2100, and to the Assistant Area Manager for Construction, Western Area Power Administration, P.O. Box 921, Huron, South Dakota 57350, Attention: Code B3000, for information, three sets each of catalog data sheets of accessories and hardware used in conductor and overhead ground wire installation; three sets of drawings showing the complete insulator and overhead ground wire assemblies; and a complete materials list showing the name of the manufacturer and the manufacturer's catalog number, or type, for each item of material as listed below that he will furnish in accordance with the requirements of these specifications and tabulated in a manner similar to that indicated on the following page.

All work required by this paragraph shall be included in the Schedule for the applicable items of work for which the drawings, data, and test reports are required.

MATERIALS	MANUFACTURER	CATALOG NO. OR TYPE
Poles (state species)	_____	_____
Crossarms	_____	_____
H-frame crossarm fillings (phase fittings)	_____	_____
Twisted shackles	_____	_____
Pole top bands	_____	_____
Four-way strain bands	_____	_____
Guy wires	_____	_____
Guy clamps	_____	_____
Anchor rods	_____	_____
X-braces	_____	_____
Knee braces	_____	_____
Conductor:		
954,000-circular mil, ACSR, 45/7	_____	_____
Steel-strand overhead ground wire 3/8-inch, high strength T-strand	_____	_____
Insulator, suspension type as follows:		
20,000-pound units	_____	_____
30,000-pound units	_____	_____

MATERIALS	MANUFACTURER	CATALOG NO. OR TYPE
Suspension clamps to fit:		
954,000-circular mil, ACSR, 45/7 conductors without armor rods	_____	_____
3/8-inch steel-strand overhead ground wire without armor rods	_____	_____
Vibration dampers for:		
attaching directly to 954,000-circular mil,ACSR 45/7 conductors	_____	_____
attaching directly to 3/8-inch steel-strand overhead ground wire	_____	_____
Compression dead ends for:		
954,000-circular mil, ACSR, 45/7 conductors	_____	_____
3/8-inch steel-strand overhead ground wire	_____	_____

MATERIALS	MANUFACTURER	CATALOG NO. OR TYPE
Compression joint for:		
954,000-circular mil, ACSR, 45/7 conductors	_____	_____
3/8-inch steel-strand overhead ground wire	_____	_____
Turnbuckles for use with dead end assemblies which support:		
954,000-circular mil, ACSR, 45/7 conductors	_____	_____
3/8-inch steel-strand overhead ground wire	_____	_____

The contractor shall furnish to the addresses above, one set each of computed offset data at least 2 weeks prior to stringing of each section of line for which offset data are required. The data shall include the beginning and ending stations for each continuous section to be strung.

3.8.2 REPORTS OF TESTS

As soon as practicable after completion of individual tests, the contractor shall furnish to the Department of Energy, Western Area Power Administration, P.O. Box 3402, Golden, Colorado 80401, Attention: Code A2100, for information, two certified copies of records or results of tests as follows:

a. POLES: Pole tests in accordance with subparagraph a.(2) of the "Tests and Inspection" paragraph in the "Wood-Pole Structures and Accessories" Section.

b. CROSSARMS, X-BRACES, AND KNEE BRACES: Crossarm, X-brace, and knee brace tests in accordance with subparagraph b.(2) of the "Tests and Inpsection" paragraph in the "Wood-Pole Structures and Accessories" Section.

c. INSULATORS: Insulator tests in accordance with the "Test" paragraph of the "Conductor Insulator Assemblies" Section.

d. CONDUCTOR: Conductor tests in accordance with the "Conductors" paragraph.

e. OVERHEAD GROUND WIRE: Overhead ground wire tests in accordance with the "Overhead Ground Wire" paragraph.

f. COMPRESSION DEAD ENDS: Compression dead end tests in accordance with the "Submittals" paragraph of the "Conductor Insulator Assemblies" Section and the "Tests and Inspection" paragraph of the "Wood-Pole Structures and Accessories" Section.

* * * * * *

DIVISION 4 - DRAWINGS

SECTION 4.1--DRAWINGS

4.1.1 DRAWINGS, GENERAL:

a. GENERAL: Some of the drawings included herein show details of fabrication, and other details and specifications not a part of work required under these specifications. Specifications and details shown on these drawings which are not applicable under these specifications shall be disregarded. Reference drawings referred to on specifications drawings, and not included herein, are not considered necessary for bidding purposes but will be furnished to the contractor, where necessary, for construction purposes. Where details shown on Standard Drawings contained in these specifications differ from those shown on other drawings or the requirements of these specifications, the details shown on other drawings or the requirements of the specifications shall govern. In the event there are minor differences as determined by Western between details and dimensions shown on the drawings and those of existing features at the site, the details and dimensions of existing features at the site shall govern.

The parts of the work for which dimensions are not shown have been drawn to scale as nearly to final dimensions as possible prior to the purchase of machinery or equipment and prior to the development of final general and detailed designs.

The contractor shall check all drawings carefully and advise Western of any errors or omissions discovered.

b. ADDITIONAL OR REVISED DRAWINGS: Except as otherwise provided in these specifications for drawings to be furnished by the contractor, the specifications drawings will be supplemented by such additional or revised general and detail drawings as may be necessary or desirable as the work progresses; and the contractor shall do no work without proper drawings and instructions. The additional or revised general and detail drawings furnished by Western will shown dimensions and details necessary for construction purposes more completely than are shown on the specifications drawings for all features of the work and for equipment and other material not yet purchased. The contractor will be required to perform the work in accordance with the additional general and detail drawings or revisions furnished by Western at the applicable prices bid in the Schedule for such work.

c. ADDITIONAL COPIES OF DRAWINGS: The contractor will be furnished such additional copies of the specifications and drawings as may be required for carrying out the work. Full-size contact prints of the original drawings from which the attached reproductions were made, other than Standard Drawings will be furnished to the contractor for construction purposes upon request. Additional prints of the Standard Drawings will be

furnished upon request. The number of prints of each drawing furnished to the contractor will be limited to four contact prints and one reproducible.

d. PLAN AND PROFILE DRAWINGS, SAG TABLES, AND CHARTS: Plan and profile drawings, sag tables, and charts, and other drawings required for construction will be furnished to the contractor as soon as possible after award of contract.

Preliminary plan and profile drawings are available for inspection by prospective bidders at the Western Area Power Administration, Office of Construction and Inspection, Denver West, Building 18, 1627 Cole Boulevard, Golden, Colorado, and at the Western Area Power Administration, Area Manager for Construction, Federal Building, 400 4th Southwest, Huron, South Dakota.

Full-size or half-size prints will be mailed to bidders upon request. Bidders will be charged $2.00 per print, not refundable, which charge will include U.S. postage. The cost of airmail delivery, if desired, will be additional.

4.1.2 LIST OF DRAWINGS:

The following drawings are made a part of these specifications:

LOCATION:

1. FP-HV 0024 - Key Map
2. FP-HV 0025 - Key Map
3. FP-HV 0026 - Key Map
4. FP-HV 0027 - Key Map
5. FP-HV 0028 - Key Map
6. FP-HV 0029 - Key Map
7. FP-HV 0030 - Key Map

ELECTRICAL:

8. FP-HV 1002 - Vibration Damper and Attachment Detail
9. FP-HV 6000 - Materials Quantities for Structures

WOOD-POLE STRUCTURES:

10. 41 6012 - Type HSB 230-kV Suspension Structure
11. 41 6013 - Type 3A 138, 161, and 230-kV Medium Angle Structure
12. 41 6014 - Type 3AB 138, 161, and 230-kV Medium Angle Structure
13. 41 6015 - Type 3AC 230-kV Angle Structure
14. 41 6018 - Type 3TA 69, 115, 138, 161, and 230-kV 3-Pole Tension Structure

POLE, CROSSARM, AND X-BRACE DETAILS:

15. 41 6024 - 138, 161, and 230-kV 2- and 3-Pole Structures; Drilling and Gaining With Overhead Ground Wire

16. 41 6027 - Crossarm Drilling Details 230-kV HS and HSB Structures
17. 41 6028 - Crossarm Drilling Details 230-kV 3AC and 3AD Structures
18. 41 6029 - X-Brace Details

STRUCTURE HARDWARE:

19. 41 6030 - Type A Four-Way Strain Band
20. 41 6031 - Type B Four-Way Strain Band
21. 41 6032 - Pole Top Band - Plain
22. 41 6033 - Pole Top Bands for Overhead Ground Wires
23. 41 6035 - Type B Pole Top Band for Overhead Ground Wires
24. 41 6040 - 230-kV H-Frame Pole Hardware Details
25. 41 6041 - 230-kV H-Frame Angle Iron Details
26. 41 6045 - Swinging Angle Bracket
27. 41 6046 - Swinging Angle Bracket for Type 3AC and 3AD 230-kV Structures
28. 41 9014 - CMP-Type Casing for Setting Wood Poles

STRUCTURE GUYING:

29. 41 6047 - Guy Assembly and Details
30. 41 6049 - Concrete Anchors
31. 41 6050 - Anchor Rod Grouting Details
32. 41 6051 - Standard Guy Arrangement; 2-Pole Tangent Structures
33. 41 6052 - Standard Guy Arrangement; 2-Pole Angle Structures
34. 41 6053 - Standard Guy Arrangement for Type 3A and 3AB Structures With Overhead Ground Wires
35. 41 6054 - Standard Guy Arrangement for Type 3T, 3TX, 3AC, and 3AD Structures With Overhead Ground Wires
36. 41 6055 - Standard Guy Arrangement for Type 3TA Structures
37. 41 9019 - Bog Shoe and Bog Anchors Details For Wood-Pole Structures

INSULATOR ASSEMBLY AND HARDWARE:

38. 41 1000 - Wood-Pole Structures Suspension Insulator Assemblies
39. 41 1001 - Insulator Assembly Details for Steel Towers
40. 41 1002 - Wood-Pole Structures Tension Insulator Assemblies
41. 41 1003 - Insulator Hardware Details
42. 41 1004 - Strain Yokes and Yoke Assemblies
43. 41 1005 - Steel Towers; Conductor; and Overhead Ground Wire Hardware Details
44. 41 1006 - Steel Tower Overhead Ground Wire Attachment Detail
45. 41 6042 - Wood-Pole - Dead End Details for Overhead Ground Wire

STRUCTURE GROUNDING:

46. 41 1012 - Wood-Pole Structures Grounding Details

FENCE GROUNDING:

47. 41 1011 - Fence Grounding Hardware

GATES:

48. 41 9000 - Prefabricated Steel Gates for Right-of-Way Fences
49. 41 9002 - Barbed Wire Gate for Right-of-Way Fences
50. 41 9020 - Barbed Wire Gate for Right-of-Way Fences

SIGNS:

51. 41 9004 - Aerial Patrol Number Signs for Wood-Pole Structures; Details and Location
52. 41 9005 - Aerial Patrol Number Signs for Steel Towers; Details and Locations
53. 41 9007 - Structure Number Signs; Details and Location

GEOLOGY:

54. FP-HV 8001 - Geologic and Explorations Location Map STA. 0 + 00 to STA. 1038 + 00
55. FP-HV 8002 - Geologic and Explorations Location Map STA. 1038 + 00 to STA. 1994 + 00
56. FP-HV 8003 - Geologic and Explorations Location Map STA. 1994 + 00 to STA. 3079 + 50
57. FP-HV 8004 - Geologic and Explorations Location Map STA. 3079 + 50 to STA. 4088 + 00
58. FP-HV 8005 - Geologic and Explorations Location Map STA. 4088 + 00 to STA. 5209 + 00
59. FP-HV 8006 - Geologic and Explorations Location Map STA. 5209 + 00 to STA. 6251 + 00
60. FP-HV 8007 - Geologic and Explorations Location Map STA. 6251 + 00 to STA. 7412 + 00
61. FP-HV 8008 - Geologic and Explorations Location Map STA. 7412 + 00 to STA. 8329 + 00
62. FP-HV 8009 - Geologic and Explorations Location Map STA. 8329 + 00 to STA. 9123 + 00
63. FP-HV 8010 - Geologic and Explorations Location Map STA. 9123 + 00 to STA. 9545 + 64

LIST OF GEOLOGIC DRAWINGS:

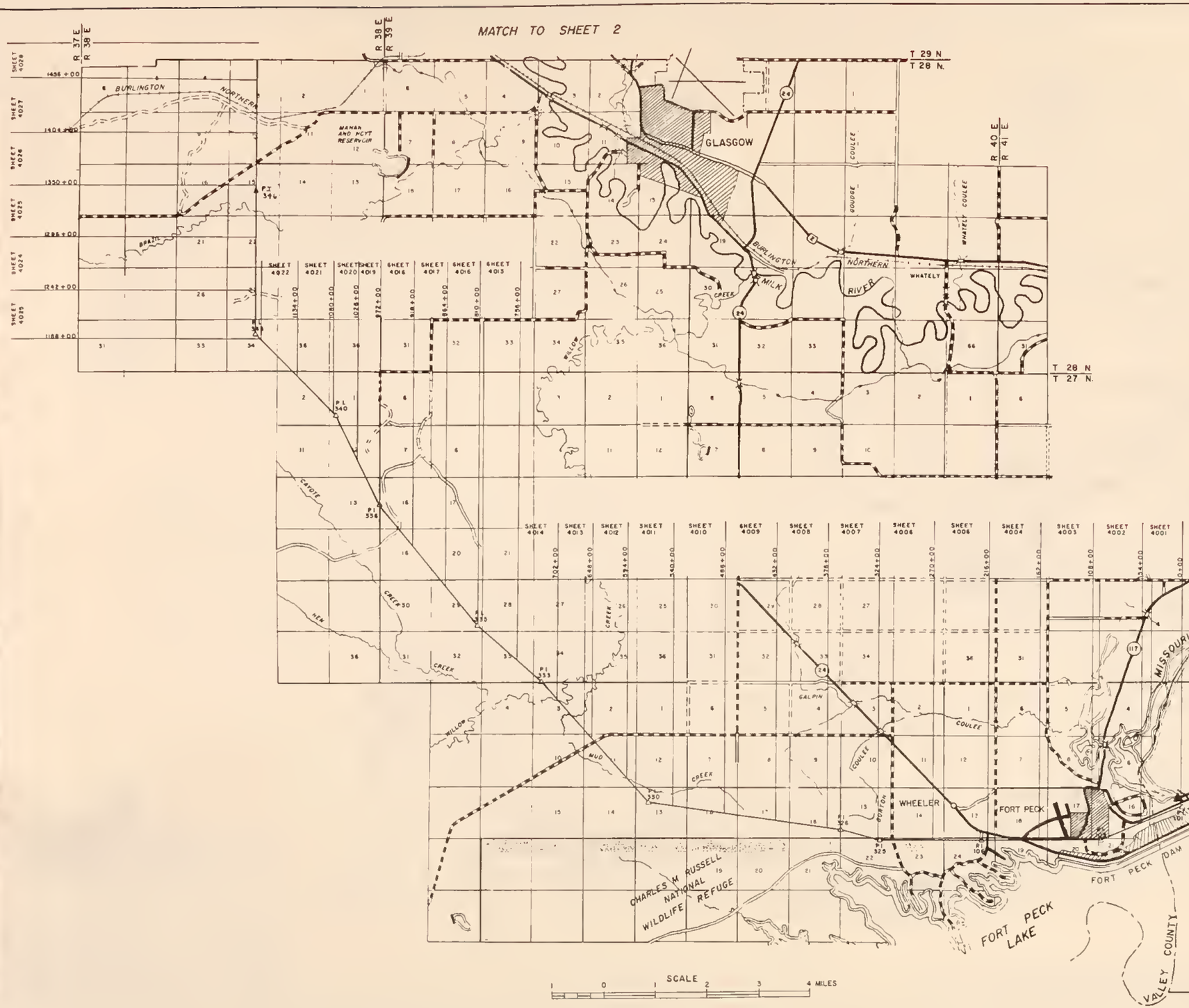
64. FP-HV 8011 - Geologic Log AP81 - 05
65. FP-HV 8012 - Geologic Log AP81 - 10
66. FP-HV 8013 - Geologic Log AP81 - 15
67. FP-HV 8014 - Geologic Log AP81 - 16
68. FP-HV 8015 - Geologic Log AP81 - 19
69. FP-HV 8016 - Geologic Log AP81 - 20
70. FP-HV 8017 - Geologic Log AP81 - 25
71. FP-HV 8018 - Geologic Log AP81 - 30
72. FP-HV 8019 - Geologic Log AP81 - 35
73. FP-HV 8020 - Geologic Log AP81 - 40
74. FP-HV 8021 - Geologic Log AP81 - 45

75. FP-HV 8022 - Geologic Log AP81 - 50
76. FP-HV 8023 - Geologic Log PR81 - 55
77. FP-HV 8024 - Geologic Log PR81 - 60
78. FP-HV 8025 - Geologic Log PR81 - 65
79. FP-HV 8026 - Geologic Log AP81 - 70
80. FP-HV 8027 - Geologic Log AP81 - 75
81. FP-HV 8028 - Geologic Log AP81 - 80
82. FP-HV 8029 - Geologic Log AP81 - 85
83. FP-HV 8030 - Geologic Log AP81 - 90
84. FP-HV 8031 - Geologic Log AP81 - 95
85. FP-HV 8032 - Geologic Log AP81 - 100
86. FP-HV 8033 - Geologic Log AP81 - 105
87. FP-HV 8034 - Geologic Log AP81 - 110
88. FP-HV 8035 - Geologic Log AP81 - 115
89. FP-HV 8036 - Geologic Log AP81 - 120
90. FP-HV 8037 - Geologic Log AP81 - 125
91. FP-HV 8038 - Geologic Log AP81 - 130
92. FP-HV 8039 - Geologic Log AP81 - 135
93. FP-HV 8040 - Geologic Log AP81 - 136
94. FP-HV 8041 - Geologic Log PR81 - 137
95. FP-HV 8042 - Geologic Log AP81 - 140
96. FP-HV 8043 - Geologic Log AP81 - 145
97. FP-HV 8044 - Geologic Log AP81 - 150
98. FP-HV 8045 - Geologic Log AP81 - 155
99. FP-HV 8046 - Geologic Log AP81 - 160
100. FP-HV 8047 - Geologic Log PR81 - 165
101. FP-HV 8048 - Geologic Log PR81 - 169
102. FP-HV 8049 - Geologic Log AP81 - 170
103. FP-HV 8050 - Geologic Log AP81 - 175
104. FP-HV 8051 - Geologic Log AP81 - 180
105. FP-HV 8052 - Geologic Log AP81 - 185
106. FP-HV 8053 - Geologic Log AP81 - 190
107. FP-HV 8054 - Geologic Log AP81 - 195
108. FP-HV 8055 - Geologic Log AP81 - 200
109. FP-HV 8056 - Geologic Log AP81 - 205
110. FP-HV 8057 - Geologic Log AP81 - 209
111. FP-HV 8058 - Geologic Log AP81 - 210
112. FP-HV 8059 - Geologic Log AP81 - 215
113. FP-HV 8060 - Geologic Log AP81 - 216
114. FP-HV 8061 - Geologic Log AP81 - 220
115. FP-HV 8062 - Geologic Log AP81 - 225
116. FP-HV 8063 - Geologic Log AP81 - 230
117. FP-HV 8064 - Geologic Log AP81 - 235
118. FP-HV 8065 - Geologic Log AP81 - 239
119. FP-HV 8066 - Geologic Log AP81 - 240
120. FP-HV 8067 - Geologic Log AP81 - 245
121. FP-HV 8068 - Geologic Log AP81 - 249
122. FP-HV 8069 - Geologic Log AP81 - 250
123. FP-HV 8070 - Geologic Log AP81 - 255
124. FP-HV 8071 - Geologic Log AP81 - 260

125. FP-HV 8072 - Geologic Log AP81 - 261
126. FP-HV 8073 - Geologic Log AP81 - 265
127. FP-HV 8074 - Geologic Log AP81 - 270
128. FP-HV 8075 - Geologic Log AP81 - 275
129. FP-HV 8076 - Geologic Log AP81 - 280
130. FP-HV 8077 - Geologic Log AP81 - 285
131. FP-HV 8078 - Geologic Log AP81 - 289
132. FP-HV 8079 - Geologic Log AP81 - 290
133. FP-HV 8080 - Geologic Log AP81 - 291
134. FP-HV 8081 - Geologic Log AP81 - 295
135. FP-HV 8082 - Geologic Log AP81 - 300
136. FP-HV 8083 - Geologic Log AP81 - 315
137. FP-HV 8084 - Geologic Log AP81 - 320
138. FP-HV 8085 - Geologic Log AP81 - 325
139. FP-HV 8086 - Geologic Log AP81 - 330
140. FP-HV 8087 - Geologic Log AP81 - 335
141. FP-HV 8088 - Geologic Log AP81 - 339
142. FP-HV 8089 - Geologic Log AP81 - 340
143. FP-HV 8090 - Geologic Log AP81 - 341
144. FP-HV 8091 - Geologic Log AP81 - 342
145. FP-HV 8092 - Geologic Log AP81 - 355
146. FP-HV 8093 - Geologic Log PR81 - 350
147. FP-HV 8094 - Geologic Log AP81 - 355
148. FP-HV 8095 - Geologic Log AP81 - 360
149. FP-HV 8096 - Geologic Log PR81 - 365

150. FP-HV 8097 - Graphic Symbols for Geologic Logs

* * * * * *



N

LEGEND

- COUNTY BOUNDARY LINE
- RESERVATION BOUNDARY LINE
- TOWNSHIP LINE
- SECTION LINE
- PAVED ROAD
- GRAVEL ROAD
- UNIMPROVED ROAD
- TRAIL
- HIGHWAY BRIDGE
- IRRIGATION CANAL WITH FLOW DIRECTION
- INTERMITTENT STREAM
- LAKE OR RESERVOIR
- RESERVOIR WITH DAM
- RAILROAD
- AIRPORT WITH SURFACED RUNWAY

FRANCIS-MEADOR-GELLHAUS INC.

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION – HURON, SOUTH DAKOTA

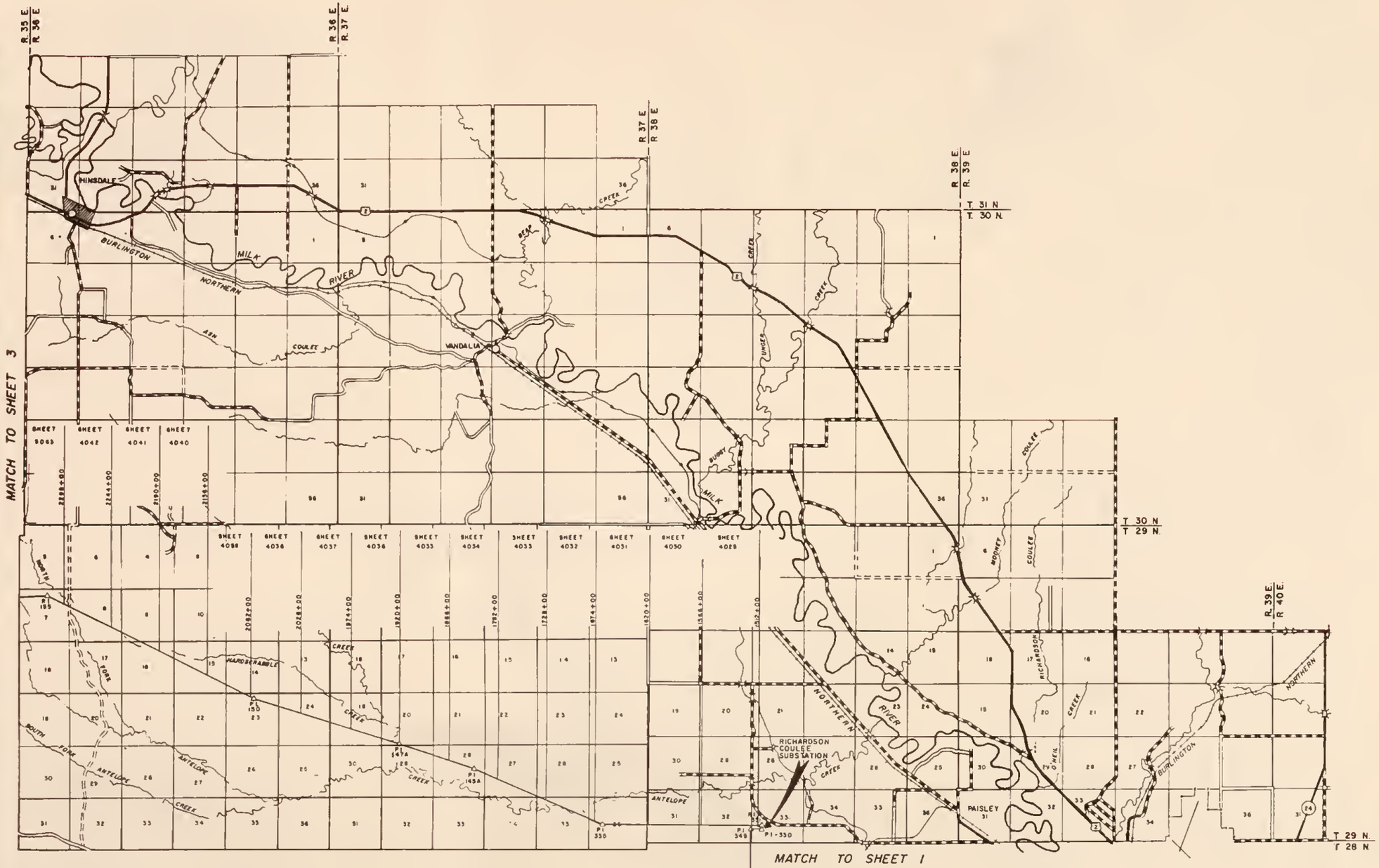
FT. PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED ____ RECOMMENDED ____
DRAWN M.J.T. APPROVED Robert D. Brown
CHECKED ____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0024

SHEET 1

2



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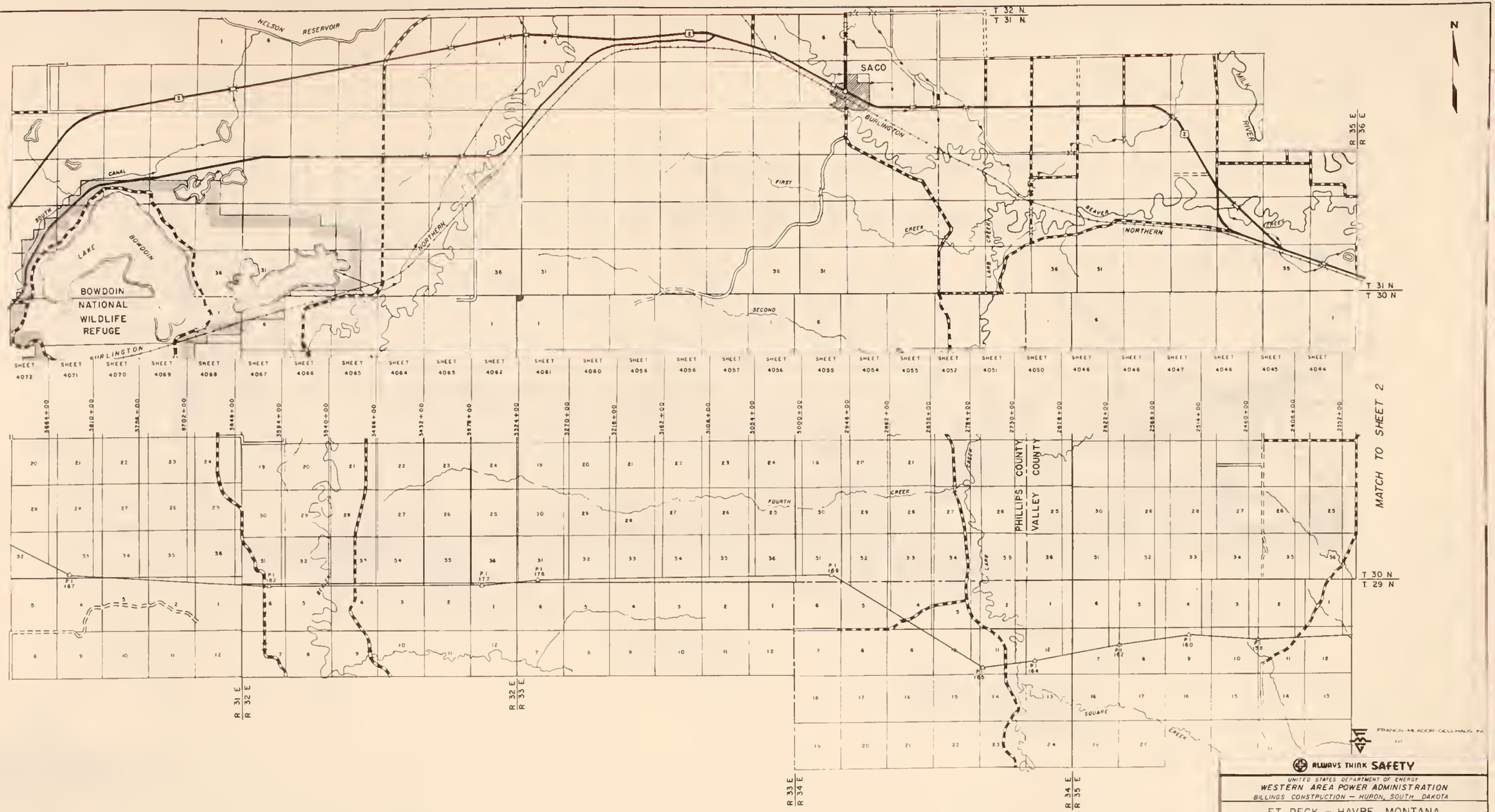
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION – HURON, SOUTH DAKOTA

FT PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED _____ RECOMMENDED _____
DRAWN M.J.T APPROVED Robert W. Feurt
CHECKED _____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0025



ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION – HURON, SOUTH DAKOTA

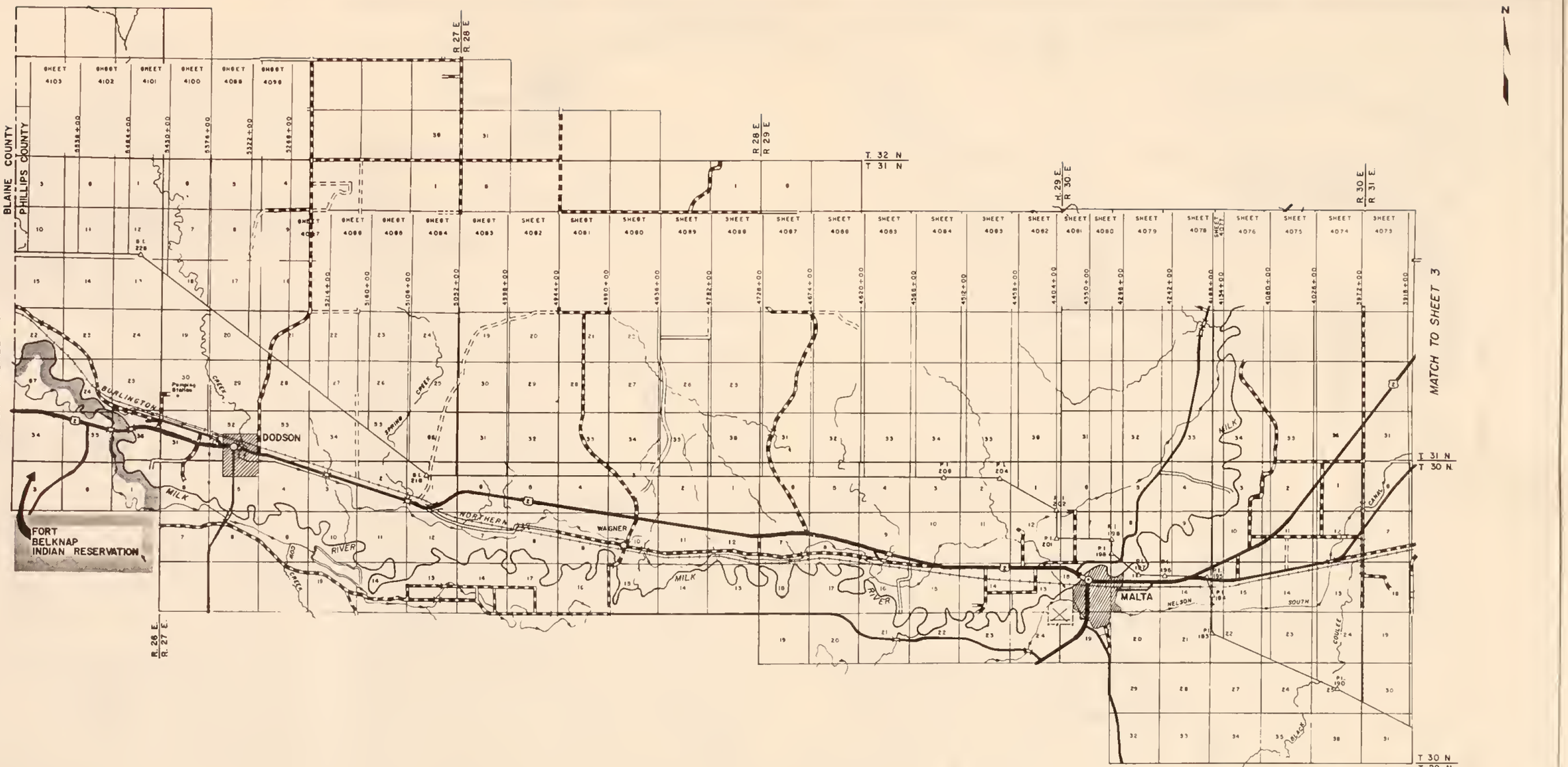
FT PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED _____ RECOMMENDED _____
DRAWN M.J.T. APPROVED Robert D. Jones
CHECKED _____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0026

SHEET 3

4



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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION — HURON, SOUTH DAKOTA

FT PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED _____ RECOMMENDED _____
DRAWN M.J.T. _____ APPROVED Robert D. Jones
CHECKED _____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0027

SHEET 4

FRANCIS MEADOR-GELLHAUS INC.

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION — HURON, SOUTH DAKOTA

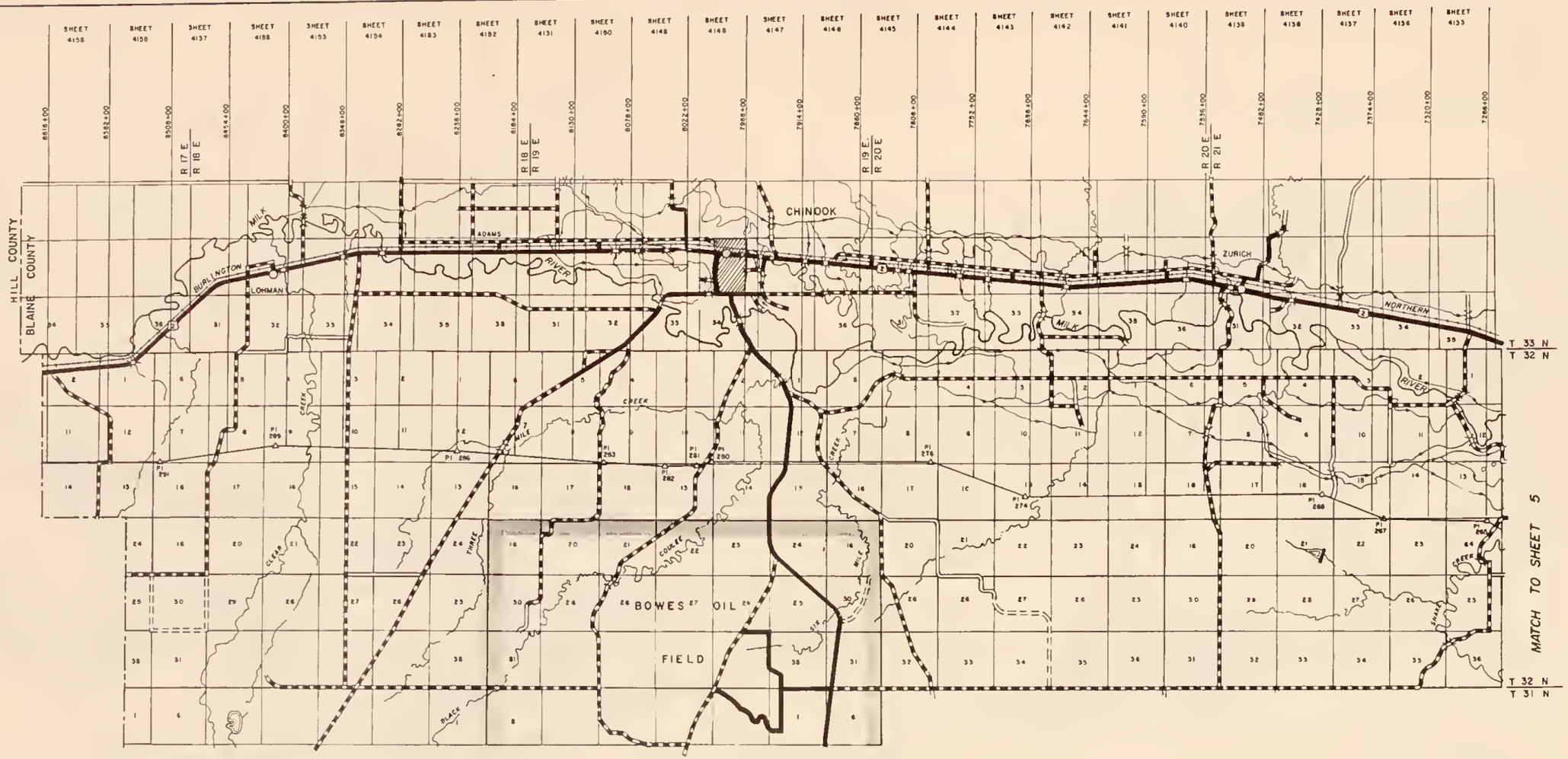
FT PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED ____ RECOMMENDED ____
DRAWN M.S.C. APPROVED J. Hurt St Jones
CHECKED ____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0028

SHEET 5

6



SCALE
1 0 1 2 3 4 MILES

FRANCIS ME ADOR GELLHAUS INC

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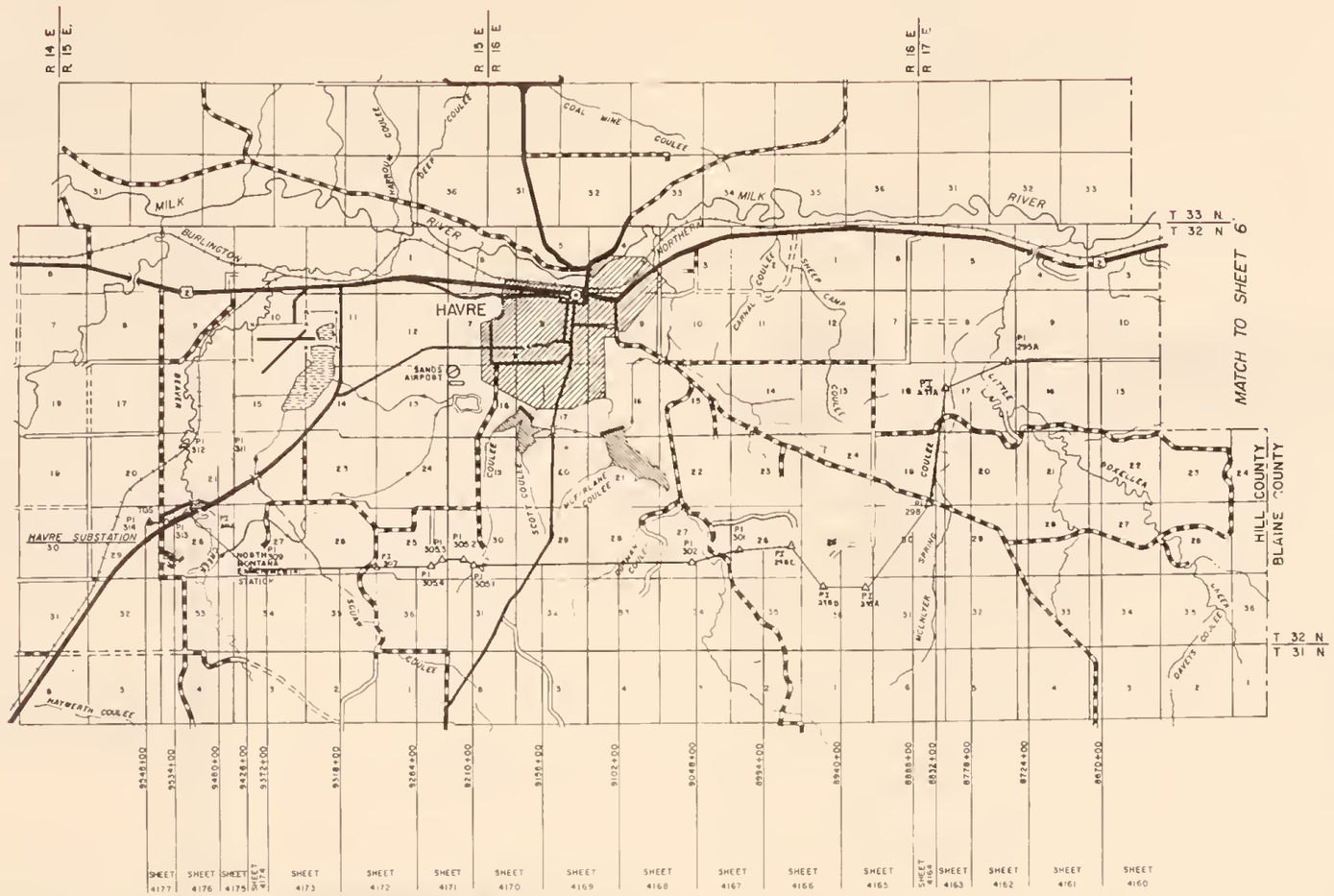
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION – HURON, SOUTH DAKOTA

FT. PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

DESIGNED ____ RECOMMENDED ____
DRAWN M.J.T. APPROVED Robert D. Jones
CHECKED ____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982 | FP – HV | 0029

SHEET 6



SCALE 1 0 2 3 4 MILES

N

FRANCIS-MEADOR-GELLHAUS, INC.

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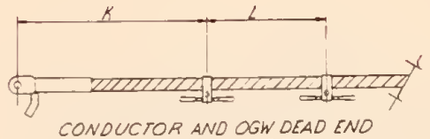
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION – HURON, SOUTH DAKOTA

FT PECK – HAVRE, MONTANA
230 KV TRANSMISSION LINE
KEY MAP

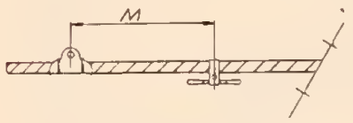
DESIGNED _____ RECOMMENDED _____
DRAWN M.J.T. APPROVED _____
CHECKED _____ ASSISTANT AREA MANAGER FOR CONSTRUCTION

June 17, 1982	FP – HV	0030

SHEET 7



CONDUCTOR AND OGW DEAD END AT BOTH ENDS OF SPAN



CONDUCTOR AND OGW SUSPENSION

NOTES

1. A tolerance of 1-inch will be permitted in vibration damper placement
2. Initial Tmax and span length values are those shown on plan and profile drawings.

*Denotes spans dead-ended at both ends

CONDUCTOR OR OGW SIZE	RULING SPAN (Ft.)	SPAN RANGE (Ft.)	INITIAL TMAX NESC HEAVY LOADING (lbs.)	60°F FINAL TENSION RANGE (lbs.)	-40°F FINAL TENSION RANGE (lbs.)	NO. OF DAMPERS REQUIRED FOR EACH CONDUCTOR OR EACH OGW PER SPAN	VIBRATION DAMPER SPACING INCHES			DAMPER ASSEMBLY WEIGHT (lbs.)
							K	L	M	
954 KCM ACSR 45/7	700	228 TO 1000	10,000	3684	5346					
	327	240 TO 373	2500	961	1069					
	348	* 348	3000	1130	1292					
	800	* 800	10,000	3786	5080					
	841	* 841	10,000	3820	4997					
	920	* 920	10,000	3878	4866					
	1460	* 1460	11,410	4661	5259					
	813	* 813	10,000	3797	5053					
3/8-inch HS OGW	700	228 TO 1460	4630	1668	2397					
	327	240 TO 373	1336	490	614					
	348	* 348	2000	342	379					
	800	* 800	4630	1484	1979					
	841	* 841	4630	1429	1647					
	920	* 920	4630	1347	1651					
	813	* 813	4630	1466	1934					

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS – GOLDEN, COLORADO

FORT PECK - HAVRE
230-kV TRANSMISSION LINE
MONTANA
VIBRATION DAMPERS
LOCATION AND ATTACHMENT DETAILS

DESIGNED Brian C. Mara RECOMMENDED A.E. Swigart
DRAWN Brian C. Mara APPROVED
CHECKED Linda L. Cook CHIEF, POWER BRANCH

SEPTEMBER 2, 1983 | FP-HV | 1002

STRUCTURE DESIGN	BASIC STRUCTURE TYPE	USE	CONDUCTOR INSULATOR ASSEMBLIES					OVERHEAD GROUND WIRE ASSEMBLIES			POLE BANDS			GUY ASSEMBLIES		ANCHORS	X-BRACE	
			SUSPENSION			TENSION	HORIZONTAL LINE POST	SUSPENSION		TENSION	POLE TOP	4-WAY STRAIN		SINGLE	DOUBLE			
			12-Units	13-Units	13-Units (With yoke plate & two suspension clamps)	13-Units		Standard Assembly	With yoke plate & two suspension clamps			Type A	Type B					
HSB	HSB	Suspension	3	—	—	—	—	2	—	—	2	—	—	—	—	—	1	
HSB-1	HSB	Suspension	3	—	—	—	—	2	—	—	2	—	—	—	—	—	2	
HSB-2	HSB	Suspension	3	—	—	—	—	2	—	—	2	—	—	1	—	1	2	See Note 1
HSB-3	HSB	Suspension	3	—	—	—	—	2	—	—	2	—	2	4	—	2	1	See Note 2
3A-1	3A	Suspension	—	—	3	—	—		2	—	—	3	3	4	2	6	—	
3A-2	3A	Suspension	—	3	—	—	—	2	—	—	—	3	3	6	—	5	—	
3A-3	3A	Suspension	—	—	3	—	—	2	—	—	—	3	3	4	2	6	—	
3A-4	3A	Suspension	—	—	3	—	—	—	2	—	—	3	6	1	7	8	—	
3AB-2	3AB	Suspension	—	3	—	—	—	2	—	—	—	3	—	6	—	5	—	
3AB-3	3AB	Suspension	—	—	3	—	—	2	—	—	—	3	—	4	2	6	—	
3AC-1	3AC	Suspension	—	3	—	—	—	2	—	—	—	6	—	1	—	1	2	
3AC-2	3AC	Suspension	—	3	—	—	—	2	—	—	—	6	—	—	1	1	2	
3AC-3	3AC	Suspension	—	3	—	—	—	2	—	—	—	6	1	1	1	2	2	
3AC-4	3AC	Suspension	—	3	—	—	—	2	—	—	—	6	1	—	2	2	2	
3TA-1	3TA	Tension	—	—	—	6	3	—	—	4	—	7	12	—	10	10	—	
3TA-2	3TA	Tension	—	—	—	6	3	—	—	4	—	8	15	3	11	14	—	
3TA-4	3TA	Tension	—	—	—	6	3	2	—	—	2	3	12	—	6	6	2	
3TA-5	3TA	Tension	—	—	—	6	3	—	—	4	—	7	12	5	5	10	—	
3TA-6	3TA	Tension	—	—	—	6	3	—	—	4	—	7	9	8	7	14	—	
3TA-7	3TA	Tension	—	—	—	6	—	—	—	4	—	6	6	—	10	10	—	
3TA-8	3TA	Tension	—	—	—	6	—	—	—	4	—	6	6	5	5	10	—	

NOTES

1. Conductor weights (9-100 lb weights) also required at this structure
2. Attach Type B 4-way strain bonds 4-feet below ℄ of crossarm

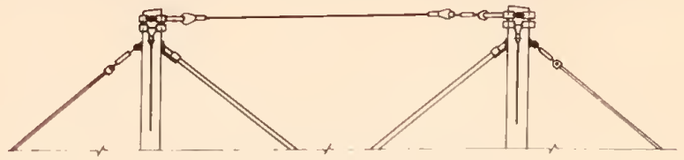
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS — GOLDEN, COLORADO

FORT PECK - HAVRE
230 KV TRANSMISSION LINE
MONTANA
MATERIALS QUANTITIES
FOR STRUCTURES

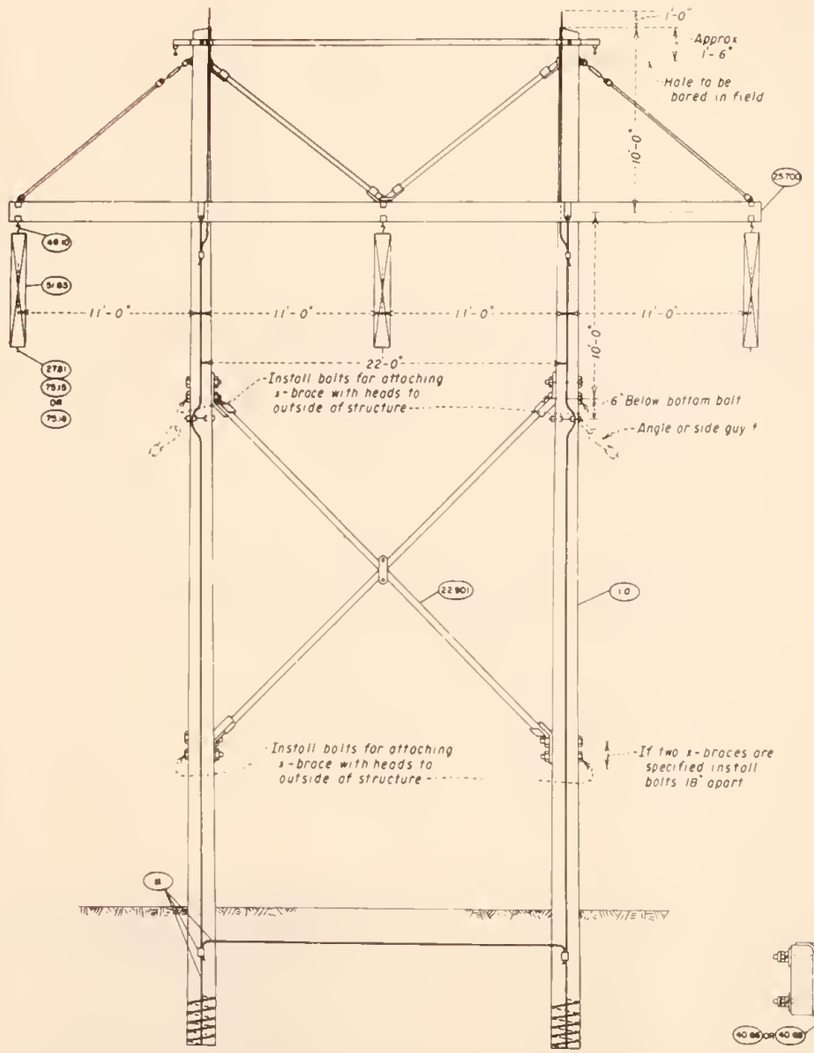
DESIGNED Susan C. Pierce — RECOMMENDED
DRAWN — APPROVED
CHECKED — CHIEF, POWER BRANCH

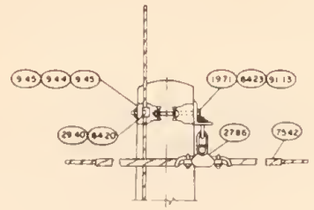
AUGUST 2, 1983 | FP-HV | 6000

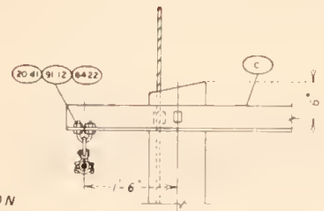
10



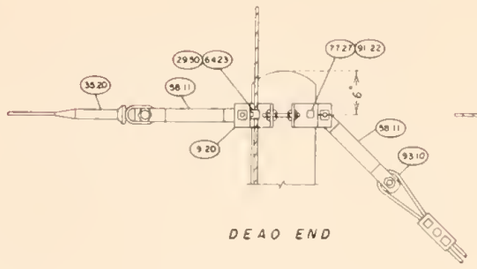
TENSION ATTACHMENT OF OGW



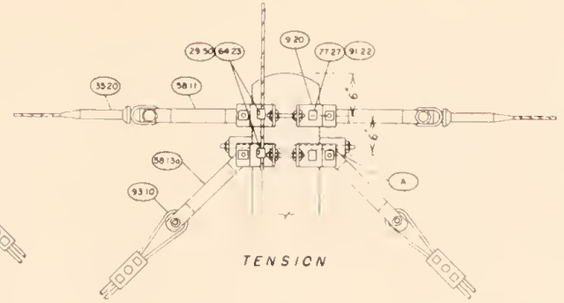




SUSPENSION

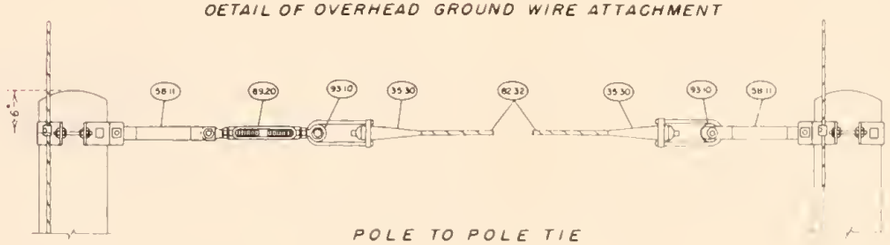


DEAD END



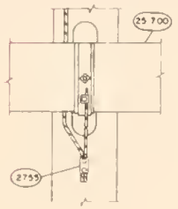
TENSION

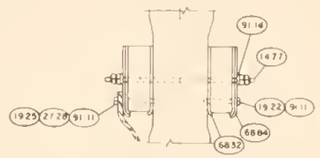
DETAIL OF OVERHEAD GROUND WIRE ATTACHMENT



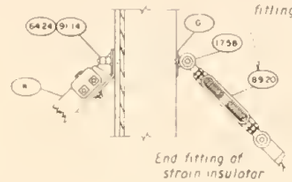
POLE TO POLE TIE

(For tension or dead end attachment of OGW)



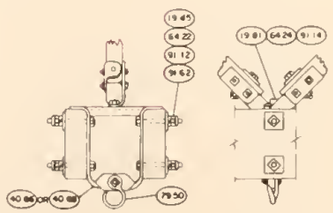


DETAIL OF CROSSARM ATTACHMENT

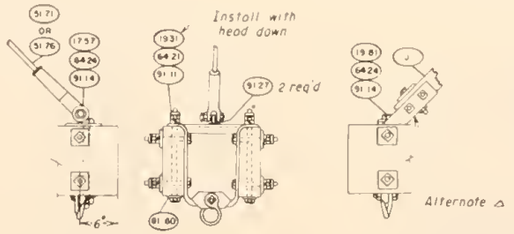


Not required if Item J with adjustable fitting is used

DETAIL OF KNEE BRACE AND STRAIN INSULATOR ATTACHMENT TO POLE



DETAIL OF CENTER PHASE FITTING ATTACHMENT



(Details if wood, fiberglass, or epoxyglass guy strain insulators used)

(Detail if wood guy strain brace is used)

DETAILS OF ENO FITTING ATTACHMENT

STRUCTURE MATERIAL

PART NO	QUANTITY	DESCRIPTION	REFERENCE
1 0	2	Pole	E40-D-5693
14 77	2	Bolt, double arming, 7/8" x 24" with 4 nuts, use extra nuts as locknuts	
17 57	2	Bolt, shoulder eye, with punched eye, 7/8" x 2 1/2", 1 7/8" min thread length	
17 58	2	Bolt, shoulder eye, with punched eye, 7/8" x 14"	
19 22	2	Bolt, machine, with hexagonal head, 1/2" x 4 1/2", no nut	
19 23	2	Bolt, machine, with hexagonal head, 1/2" x 5 1/2", no nut	
19 31	4	Bolt, machine, 1/2" x 11"	
19 45	12	Bolt, machine, 5/8" x 5"	
19 81	1	Bolt, machine, 7/8" x 2 1/2"	
22 901	1	X-Brace, 3 1/2" x 8" x 1/2" for 22' pole spacing	
25 700	2	Crossarm, Laminated wood, 3 1/8" x 9" x 45'-0"	E40-D-5992
27 28	2	2PC Copper alloy ground connector for 1/2" bolt and No. 2 copperweld	Burndy GB
27 55	2	Clamp, parallel groove, 2 bolt, copper-alloy	E40-D-4978
4066 to 4068	3	Fitting, phase Select phase fitting with dim "B" to match pole gain	E40-D-5991
51 71 OR 51 76	2	Insulator, wood guy strain, clevis-clevis Min ultimate strength of 25,000 # 10'-9" long Insulator, fiberglass or epoxyglass guy strain, clevis-clevis Min ultimate strength of 25,000 # 10'-9" long	
64 21	4	Locknut for 7/8" bolt	
64 22	12	Locknut for 3/4" bolt	
64 24	5	Locknut for 1" bolt	
68 12	4	Plate, flat gain	E40-D-5991
68 84	4	Plate, ribbed tie	E40-D-5991
79 50	3	Shackle, twisted	E40-D-5991
89 20	2	Turnbuckle, clevis-eye 7/8" x 12"	BT-3155
91 11	8	Lock washer, spring for 1/2" bolt	
91 12	12	Lock washer, spring, for 5/8" bolt	
91 14	9	Lock washer, spring, for 7/8" bolt	
91 27	4	Washer, round, 3" x 1/4" with 13/16" hole	
91 60	4	Washer, square, flat, 2" x 2" x 1/8", 9/16" hole	
91 62	12	Washer, square, flat, 2 1/4" x 2 1/4" x 5/16", 11/16" hole	
G	2	Grid gain	MIF PX-122
K	2	Brace, knee, spacing 10'-8", drop 8'-0", 3 3/8" x 4 3/8" section Strain brace with adjustable fitting, or eye fitting and Part No 89 20 length as req'd, min ultimate strength of 25,000 #	
J	2		
#		Grounding material part nos and description shown on E40-D-4978	

INSULATOR MATERIAL

PART NO	QUANTITY	DESCRIPTION	REFERENCE
27 81	3	Clamp, suspension with socket fitting (for conductor)	E40-D-2808
48 10	3	Hook, suspension	E40-D-3182
51 65	3 Strings of 12	Insulator, suspension type, 10" dia, 5 3/4" spacing	E40-D-2808
75 13 OR 75 18	3	Rod, armor, tapered, single support, set	E40-D-2808
		Rod, armor, preformed, single support, set	E40-D-2808

OVERHEAD GROUND WIRE MATERIAL

PART NO	QUANTITY SUSP	QUANTITY D E	QUANTITY TEN	DESCRIPTION	REFERENCE
9 20		2	2	Band, four-way strain	E40-D-3667
943, 944, 945	2			Band, pole top	E40-D-5994
19 71	2			Bolt, machine, 3/4" x 12"	
20 41	2			Bolt, "U", 3/8" x 3" long, with 4 hex nuts	E40-D-5994
27 86	2			Clamp, suspension, with 2 1/4" link	
29 40	2			Clip, ground, with 3/8" x 1 1/2" carriage bolt	E40-D-5994
29 50		2	4	Clip, ground, 3/4" x 2 1/2" cone head bolt	E40-D-3667
35 20		2	4	Dead end, compression type for OGW	
35 30		2	2	Dead end, automatic wire type for guy strand, short bail	
58 11		6	6	Link, 17" long, 15/16" hole, 3/4" x 2 1/2" bolt	E40-D-3667
64 20	2			Locknut for 3/8" bolt	
64 22	4			Locknut for 5/8" bolt with hex nuts	
64 23	2	2	4	Locknut for 3/4" bolt	
75 42	2			Rods, armor, preformed, set	
77 27		4	8	Lag screw, 1/2" x 4", taller drive thread	
82 32	as req'd			Strand, steel, 7/16", high strength steel	
89 20		1	1	Turnbuckle, clevis-eye, 7/8" x 12"	BT-3155
91 12	4			Lock washer, spring, for 5/8" bolt	
91 13	2			Lock washer, spring, for 3/4" bolt	
91 22		4	4	Washer, round, flat, 1 3/8" O.D., 9/16" hole	
93 10		4	6	Wheel, sheave, for 7/16" high strenght steel	E40-D-3667
Δ		2		Band, Pole with hole for clip	HB-3108
C	1			Angle Iron, 3" x 3" x 3/8" x 25'-6"	E40-D-5993
58 13a			4	Link, 17" long, 15/16" hole, 3/4" x 2 1/2" bolt	E40-D-3667

NOTES

* Use only when specified
△ Greater than 22-inch length may be required for extra large poles
Quantities will change if Part No J brace is used
△ Part No J may be used as an alternate to Part No 51 71 or 51 76

B	1-16-80	REVISED CROSSARM DIMENSION AND MACHINE BOLT SIZE
A	7-26-79	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

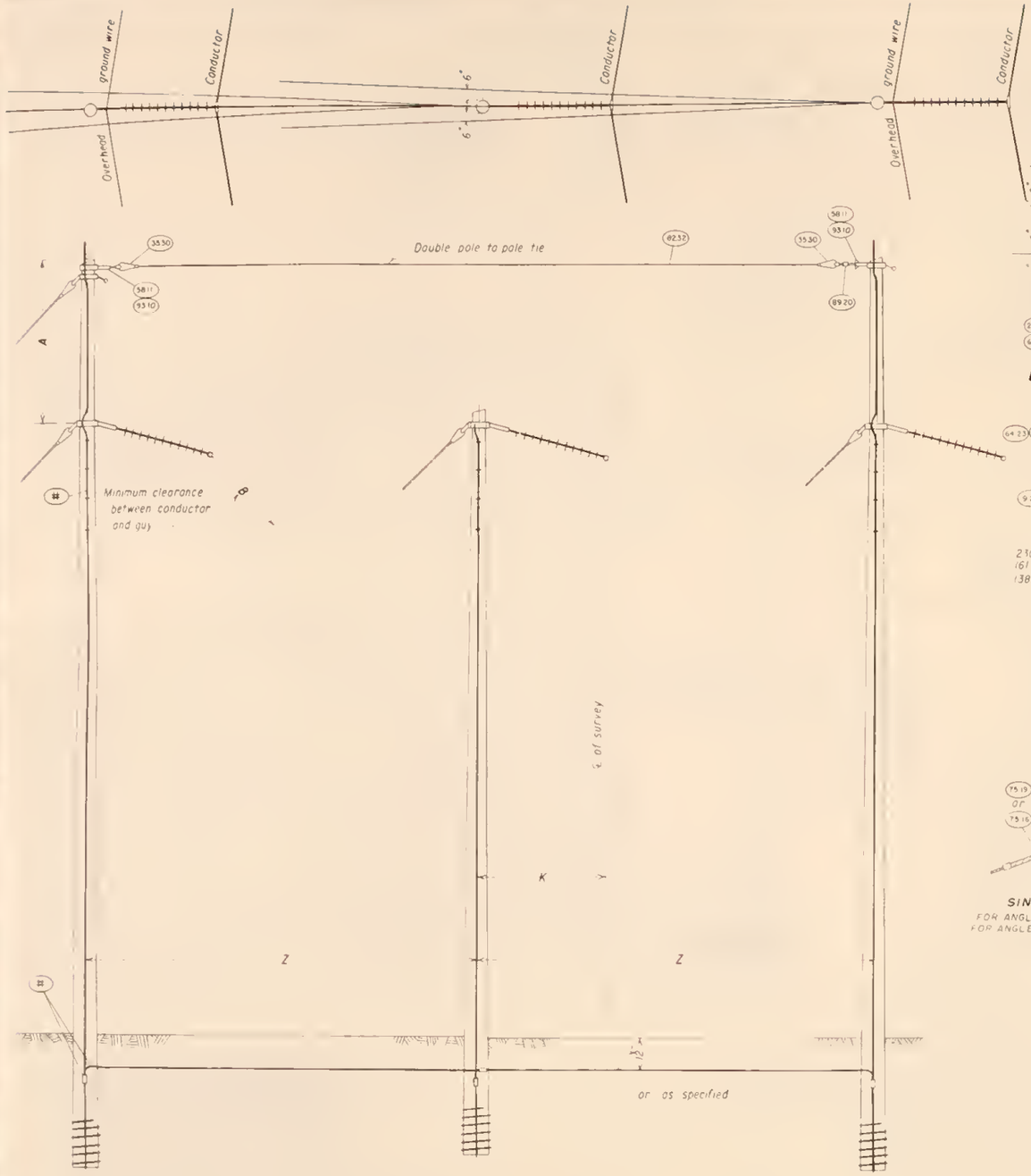
STANDARD DESIGNS

TRANSMISSION LINES
TYPE HSB 230-KV
SUSPENSION STRUCTURE

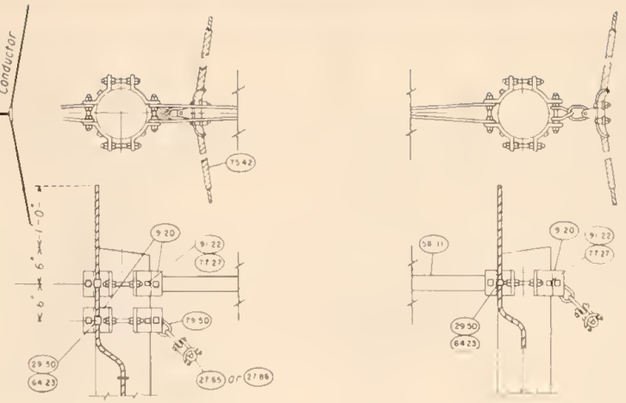
DESIGNED LMW — SUBMITTED Robert L. Cooper
DRAWN LMW — RECOMMENDED Donald D. Denny
CHECKED LMW — APPROVED C. H. Cabral
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 8, 1978 — E40-D-5990

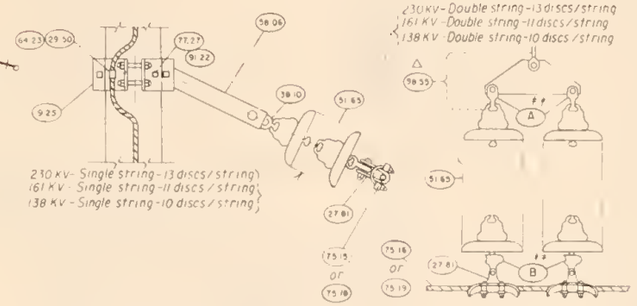
JULY 26, 1979 — 4 — 6012



VOLTAGE	A	K	Z	B
138-KV	10'-0"	6-0	23-0"	5'-0"
161-KV	10'-0"	6-6"	24-0"	5'-6"
230-KV	10'-0"	7-6"	25-0"	6'-5"



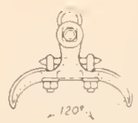
DETAIL OF OVERHEAD GROUND WIRE ATTACHMENT



SINGLE STRING — OOUBLE STRING #

DETAIL OF INSULATOR ATTACHMENT

SINGLE STRING WITH YOKE
FOR ANGLES OF 40° TO 60° WITH ARMOR RODS
FOR ANGLES OF 15° TO 60° WITHOUT ARMOR RODS



LARGE ANGLE SUSPENSION CLAMP FOR OVERHEAD GROUND WIRE
PART No 27 85 *

NOTES

Use two lag screws and washers for each four-way strain band
* For line angles up to and including 30° use suspension clamp Part No 27 86
* For line angles greater than 30° use large angle suspension clamp Part No 27 85
# Use only when specified
Poles shall be given rake of 1/4-inch for each foot of pole length against strain
Use item 28 52 at (A) and item 38.10 at (B) when insulator caps are specified to be away from structure
△ When sized suspension clamps are specified the length of the yoke shall be equal to the length of the suspension clamp plus at least 10 inches

REFERENCE DRAWINGS

GROUNDING DETAILS	E40-D-4978
GUY ARRANGEMENT, FOR TYPE 3A AND 3AB STRUCTURES WITH OVERHEAD GROUND WIRES	E40-D-4241

STRUCTURE MATERIAL

PART No	QUANTITY WITH OVERHEAD GROUND WIRES	DESCRIPTION	DWG No E40-D
1	3	Pole, see structure list for height	
9 20*	2	Band, four-way strain, type A (when specified)	3667
9 23	3	Band, four-way strain, type B	5186
29 50	5	Clip, ground	5186
58 06	3	Link, connecting pr	5186
58 11*	2	Link, connecting pr (use with 9 20)	3667
64 23	5	Locknut for 3/4" bolt	
77 27	10	Lag screw, 1/2" x 4" fetter drive thread	
91 22	10	Washer, round flat, 1 3/8" O.D. 9/16" hole	
93 10	2	Sheave wheel, for 7/16" high strength steel strand	3667
35 30	2	Dead end, automatic vise type for guy strand, short bail	
82 32	as required	Steel strand, 7 wire, 7/16" high strength	
89 20	1	Turnbuckle, clevis-eye, 7/8" x 12"	BT-3155
#	Grounding material part nos and description shown on E40-D-4978		

INSULATOR MATERIAL

	SINGLE STRING			SINGLE STRING WITH YOKE			OOUBLE STRING #			
	138	161	230	138	161	230	138	161	230	
27 82	–	–	–	6	6	6	–	–	–	Clamp, suspension, without connector
27 81	3	3	3	–	–	–	6	6	6	Clamp, suspension, with socket fitting — 2808
28 52	–	–	–	–	–	–	2 ##	2 ##	2 ##	Clevis, socket, 4 1/2" long
38 10	3	3	3	3	3	3	3	3	3	Connector, ball-eye — 3182
51 65	30	33	39	30	33	39	60	66	78	Insulators, suspension type, 10" O.D., 5 3/4" spacing — 2808
75 15 or 75 18	3	3	3	–	–	–	–	–	–	Rod, armor, tapered, single support (ACSR) set — 2808
										Rod, armor, preformed, single support (ACSR) set
75 16 or 75 19	–	–	–	3	3	3	3	3	3	Rod, armor, tapered, double support (ACSR) set
										Rod, armor, preformed, double support (ACSR) set
△ 98 53	–	–	–	3	3	3	–	–	–	Yoke, complete with fittings
△ 98 55	–	–	–	–	–	–	3	3	3	Yoke, complete with fittings

OVERHEAD GROUND WIRE MATERIAL

	QUANTITY		
9 20	1	Band, four-way strain	3667
27 85 or 27 86	2*	Clamp, suspension, with 2 1/4" link for OGW	
29 50	1	Clip, ground	3667
			3667
64 23	1	Locknut for 3/4" bolt	
75 42	2	Rod, armor, preformed, set	
77 27	2	Lag screw, 1/2" x 4", fetter drive thread	
79 50	2	Shackle, twisted	3664
91 22	2	Washer, round flat, 1 3/8" O.D. 9/16" hole	

A	8-6-1979 A2-MS	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

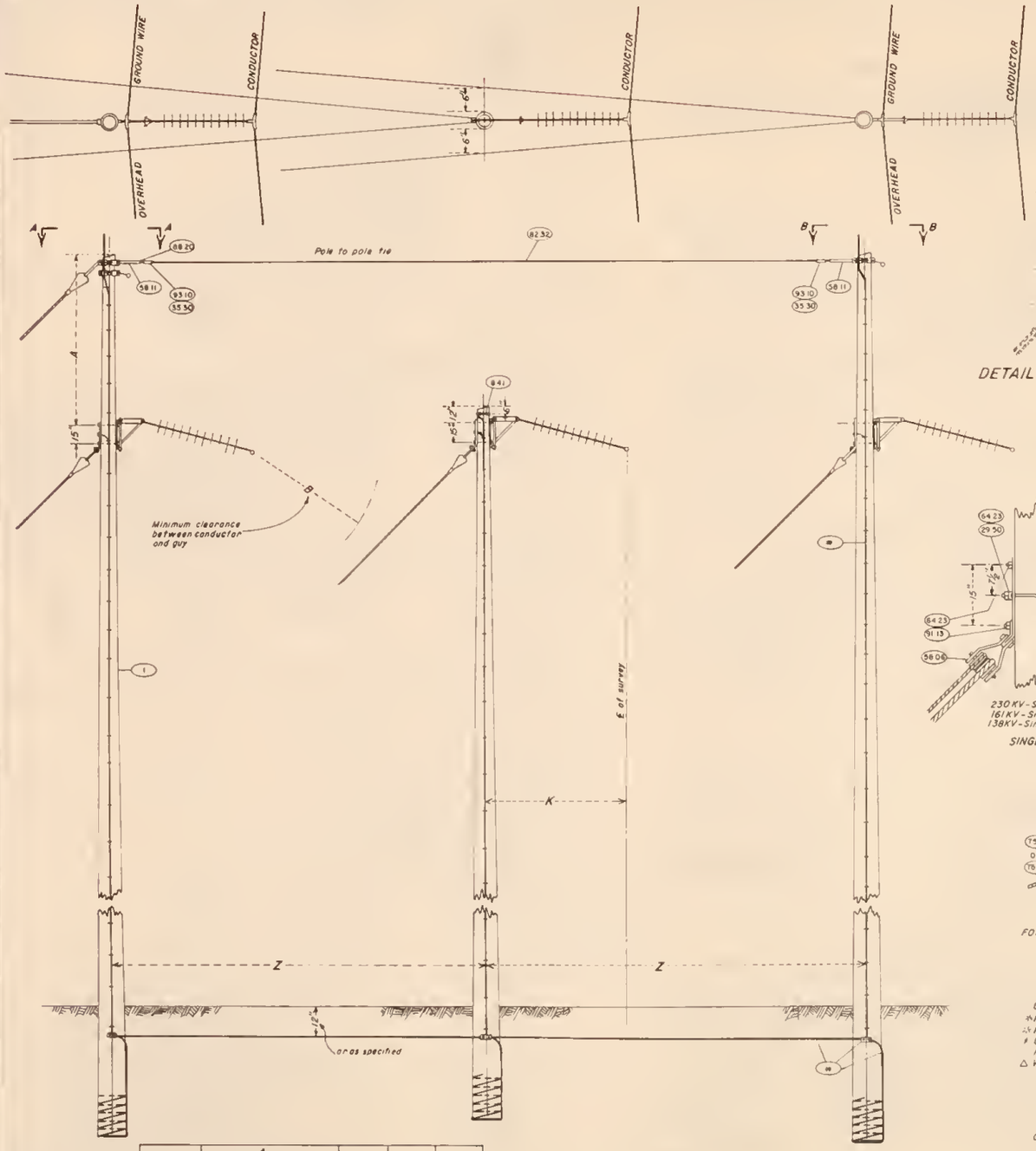
TRANSMISSION LINES
TYPE 3A 138, 161, AND 230-KV MEDIUM ANGLE STRUCTURE

DESIGNED — SUBMITTED
DRAWN — RECOMMENDED
CHECKED — APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

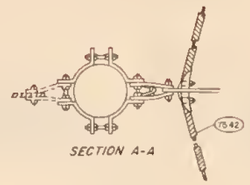
GOLDEN, COLORADO AUGUST 9, 1978 | E40-D-5686

AUGUST 6, 1979 | 41 | 6013

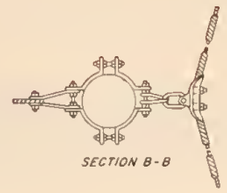
12



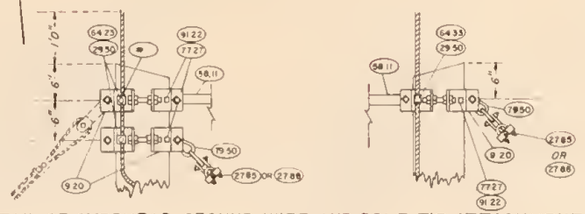
VOLTAGE	A 30° PROTECTIVE ANGLE	K	Z	B
138 - KV	10'-0"	7'-0"	24'-0"	5'-0"
161 - KV	10'-0"	7'-6"	25'-0"	5'-6"
230 - KV	10'-0"	8'-6"	25'-0"	6'-5"



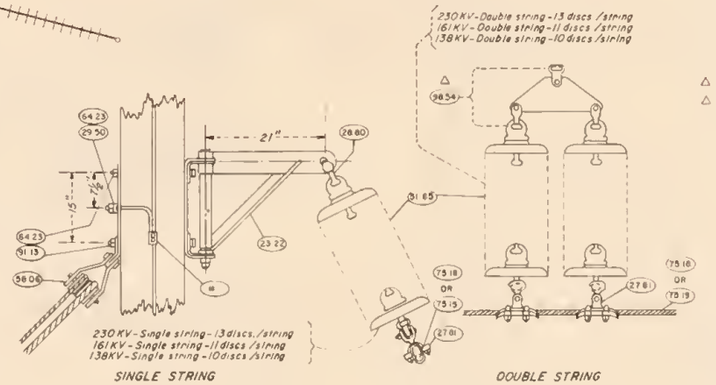
SECTION A-A



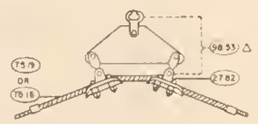
SECTION B-B



DETAIL OF OVERHEAD GROUND WIRE AND POLE TIE ATTACHMENT



OETAIL OF INSULATOR ATTACHMENT



SINGLE STRING WITH YOKE
FOR ANGLES OF 40° TO 60° WITH ARMOR RODS
FOR ANGLES OF 15° TO 60° WITHOUT ARMOR RODS

LARGE ANGLE SUSPENSION CLAMP FOR OVERHEAD GROUND WIRE ✳
PART No 2785

NOTES

Use two lag screws and washers for each four-way strain band
✳ For line angles up to and including 30° use suspension clamp Part No 2786
✳ For line angles greater than 30° use large angle suspension clamp Part No 2785
Use only when specified
Poles shall be given rake of 1/8"-inch for each foot of pole length against strain
△ When sized suspension clamps are specified the length of the yoke shall be equal to the length of the suspension clamp plus at least 10 inches

REFERENCE DRAWINGS

GUY ARRANGEMENT FOR TYPE 3A AND 3AB STRUCTURES WITH OVERHEAD GROUND WIRE E40-D-4241

STRUCTURE MATERIAL

PART No	QUANTITY WITH OVERHEAD GROUND WIRES	DESCRIPTION	OWG. No. E40-D-
1	3	Pole, see structure list for height	
941	1	Band, pole top	2781
2322	3	Bracket, extension, 21" complete with 5/8" attachment bolts Hughes Bros # 2822 B	5719
2950	3	Clip, ground	3667
6423	9	Locknut for 3/4" bolt	
9113	6	Lock washer, spring for 3/4" bolt	
5806	3	Link, connecting, pair	5186
5811	3	Link, connecting, pair	3667
#	Grounding material part no's and description shown on 40-D-4978		

INSULATOR MATERIAL

	SINGLE STRING			SINGLE STRING WITH YOKE ✳			DOUBLE STRING #				
	138	161	230	138	161	230	138	161	230		
2782	-	-	-	6	6	6	-	-	-	Clamp, suspension, without connector	
2781	3	3	3	-	-	-	6	6	6	Clamp, suspension, with socket fitting	2808
2880	3	3	3	3	3	3	3	3	3	Y-Ball clevis	3182
5165	30	33	39	30	33	39	60	66	78	Insulator, suspension type, 10"D, 5 3/4" spacing	2808
7515 or 7518	3	3	3	-	-	-	-	-	-	Rod, armor, tapered, single support (ACSR) set Rod, armor, preformed, single support (ACSR) set	2808
7516 or 7519	-	-	-	3	3	3	3	3	3	Rod, armor, tapered, double support (ACSR) set Rod, armor, preformed, double support (ACSR) set	
△ 9853	-	-	-	3	3	3	-	-	-	Yoke, complete with fittings	
△ 9854	-	-	-	-	-	-	3	3	3	Yoke, complete with fittings	

OVERHEAD GROUND WIRE MATERIAL

	QUANTITY		
920	3	Bond, four way strain	
2785 or 2786	2 ✳	Clamp, suspension, with 2 1/4" link for OGW	
2950	3	Clip, ground	3667
5811	3	Link, connecting, pair	3667
6423	3	Locknut for 3/4" bolt	
7542	2	Rod, armor, preformed, set	
7727	6	Lag screw, 1/2" x 4", letter drive thread	
7950	2	Shackle, twisted	3664
8232	As Required	Steel strand, 7 wire, 7/16" High strength steel	
9122	6	Washer, round flat, 1 3/8" O.D., 9/16" hole	
9310	3	Sheave wheel, for 7/16" High strength steel	3667
3530	2	Deadend, automatic vise type for guy strand, short pair	
8920	1	Turnbuckle, clevis-eye, 7/8" x 12"	BT-3155

A	8-6-79 A2-RJK	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK REDRAWN FOR CLARITY, 12-4-79

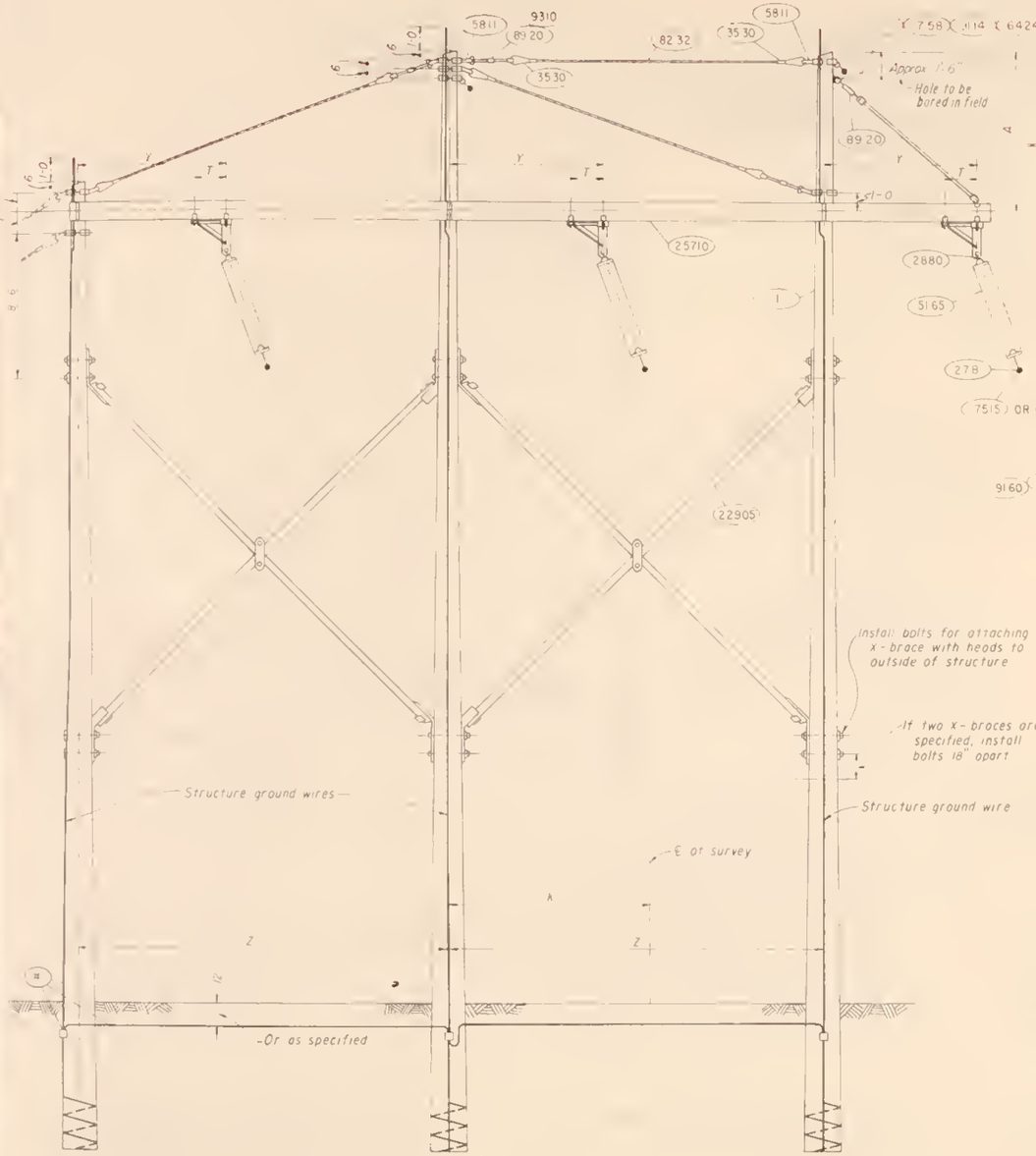
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS — GOLDEN, COLORADO

TRANSMISSION LINE STANDARDS
TYPE 3AB 138, 161, AND 230KV
MEDIUM ANGLE STRUCTURE

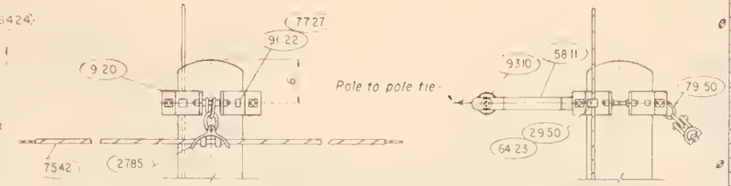
DESIGNED - E C V — RECOMMENDED
DRAWN - R L Walker — APPROVED
CHECKED - K T D — CHIEF, POWER BRANCH

GOLDEN, COLORADO AUGUST 8, 1978 | E40-D-5687

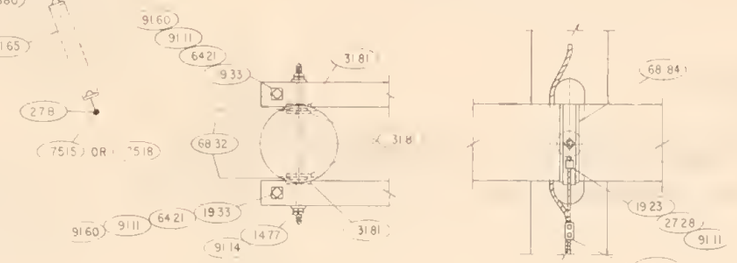
AUGUST 6, 1979 | 41 | 6014



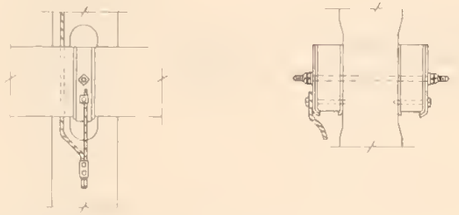
VOLTAGE	A	Z	K	Y	T
230 KV	8'-6	24'-0	11'-0	7'-8	1'-6



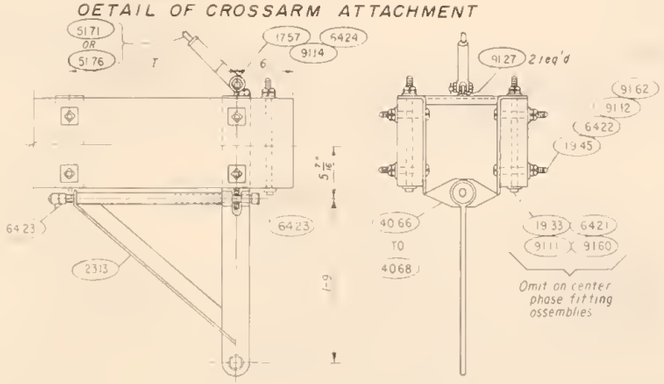
DETAIL OF OVERHEAD GROUND WIRE ATTACHMENT



DETAIL OF CROSSARM ATTACHMENT



DETAIL OF CROSSARM ATTACHMENT



DETAIL OF PHASE FITTING ASSEMBLY

PART NO	QUANTITY	STRUCTURE MATERIAL	DWG NO 41-
1	3	Pole	
9 20	6	Bond four-way strain	6030
14 77	3	Bolt, double arming 1/8" x 21" with 4 nuts, use extra nuts as locknuts	
19 23	6	Bolt, machine, with hexagonal head, 1/2" x 5 1/2" no nut	
19 33	4	Bolt, machine, 1/2" x 14"	
17 57	1	Bolt, shoulder eye, with punched eye, 7/8" x 2 1/2", 1 7/8" min thread length	
19 45	24	Bolt, machine 5/8" x 5"	
22 905	2 or 4	X-brace complete with fittings, washers, nut and bolts	
23 13	3	Bracket, swinging, angle, 18 x 21	6046
25 710	2	Crossarm, laminated wood, 31/8" x 10 1/2" x 56'-8"	
27 28	3	2pc. Copper alloy ground connector for 1/2" bolt and 2# Copperweld	Burndy G B
27 55	3	Clamp, parallel groove, 2-bolt, copper alloy	1012
17 58	1	Bolt, shoulder eye, with punched eye, 7/8" x 14"	
29 50	6	Clip, ground, with 3/4" x 2 1/2" conehead bolt	6030
31 81	24	Connector, 4 shear plate, for 7/8 bolt	
35 30	6	Deadend, automatic wise type for guy strand, short bail	
40 66 TO 40 68	6	Phase Fitting — Select phase fitting with dimension "B" which makes best fit between crossarms	6040
58 11	6	Link, connecting pair	6030
64 21	4	Locknut for 1/2" bolt	
64 22	24	Locknut for 5/8" bolt	
64 23	15	Locknut for 3/4" bolt	
68 32	6	Plate, flat gain	
64 24	2	Locknut for 7/8" bolt	
68 84	6	Plate, ribbed tie	
77 27	12	Lag screw, 1/2" x 4" fetter drive thread	
82 32	as required	Steel strand, 7-wire, 7/16" high strength	
89 20	4	Turnbuckle, clevis-eye 7/8" x 12"	BT 3155
91 11	10	Lockwasher, spring for 1/2" bolt	
91 27	2	Washer, round, 3" by 1/4" with 15/16" hole	
91 12	24	Lockwasher for 5/8" bolt	
91 22	12	Washer, round flat, 1 3/8" O.D. 3/16" hole	
91 60	8	Washer, square, flat, 2 1/4" x 2 1/4" x 3/16", 11/16" hole	
91 62	24	Washer, square,	
91 14	8	Lockwasher for 7/8" bolt	
93 10	6	Sheave wheel, for 7/16" high strength steel strand	6030
51 71 OR 51 76	1	Insulator, wood guy strain, clevis-clevis Min ultimate strength of 25,000 @ 8'-6" long Insulator, fiberglass or epoxyglass guy strain, clevis-clevis Min ultimate strength of 25,000 @ 8'-6" long	
G	1	Grid grain	

Grounding material part nos and description shown on 41 1012

PART NO	QUANTITY		INSULATOR MATERIAL	OWG NO 41-
27 81	3		Clamp suspension, with socket fitting	1000
28 80	3		Clevis, Y-ball	1003
51 65	39	3-strings of 13	Insulator, suspension type, 10" diameter 5 3/4" spacing	1002
7515 OR 7818	3		Rod armor tapered, single support for ACSR, set Rod armor preformed, single support for ACSR, set	1002

PART NO	QUANTITY	OVERHEAD GROUND WIRE MATERIAL	OWG NO 41-
27 85	2	Clamp, suspension with 2 1/4" link	
% 75 42	2	Rod, armor, preformed, for overhead ground wire	
79 50	2	Shackle, twisted	6040

REFERENCE ORAWINGS

GROUNDING DETAILS	41 1012
DRILLING AND GAINING DETAILS - 30° PROTECTIVE ANGLE	41 6024
GUY ARRANGEMENT FOR TYPE 3AC WITH O.G.W.	41 6054
CROSSARM DRILLING DETAILS	41 6028

NOTES

1. Use two lag screws and washers for each 4-way stain bond
2. Adjust nuts on angle bracket so that bracket is free to swing
3. # Use only when specified
4. @ Greater length may be required for extra larger poles

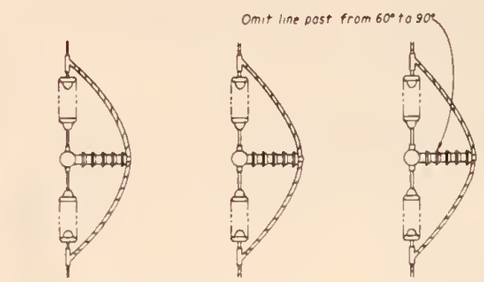
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS — GOLDEN, COLORADO

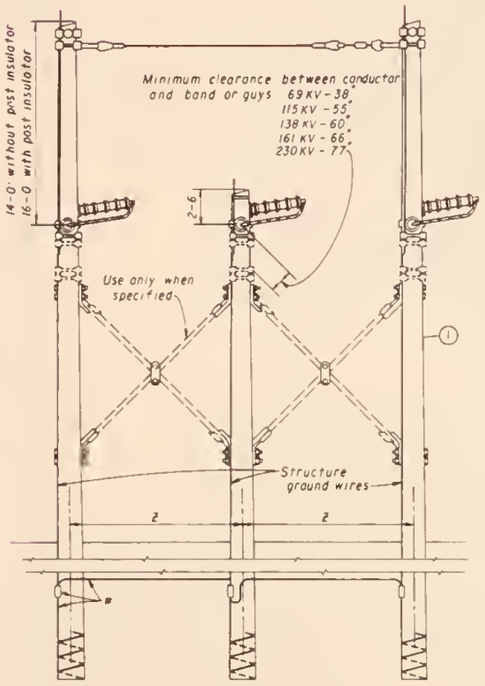
TRANSMISSION LINE STANDARDS
TYPE 3 AC 230-KV
SUSPENSION STRUCTURE

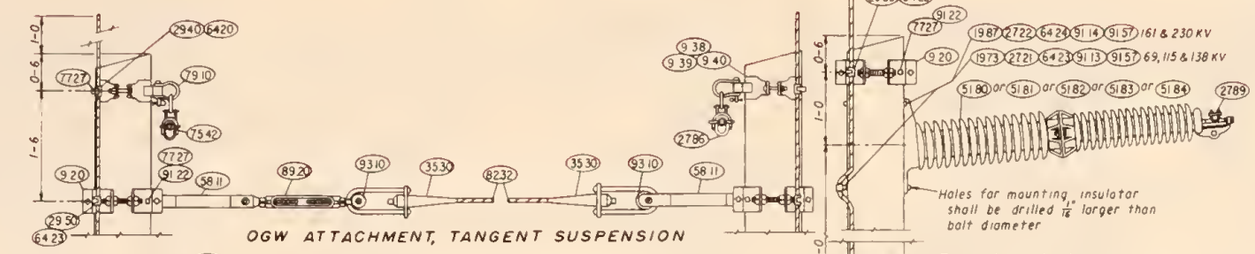
DESIGNED Frederick J. Cook — RECOMMENDED
DRAWN
CHECKED — APPROVED — DIRECTOR, DIVISION OF ELECTRICAL DESIGN

SEPTEMBER 20, 1979	41	6015

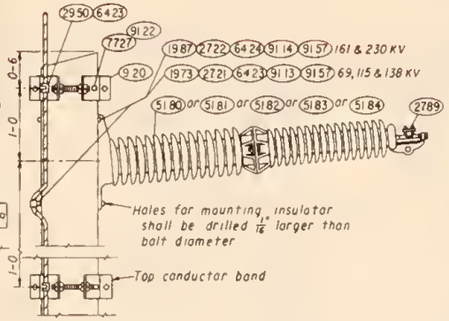
14



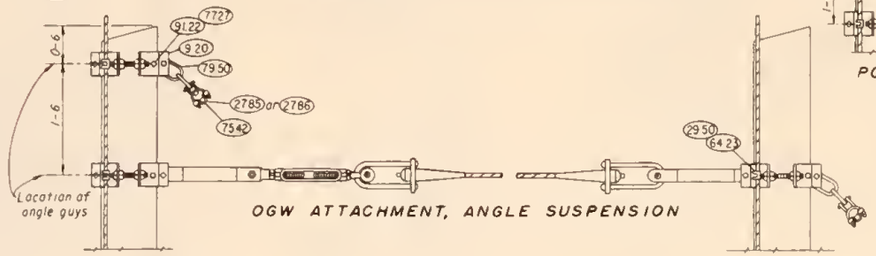




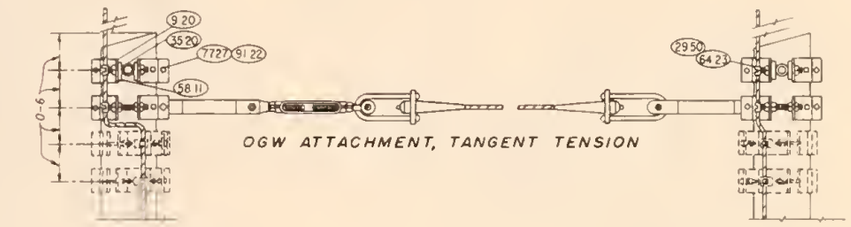
OGW ATTACHMENT, TANGENT SUSPENSION



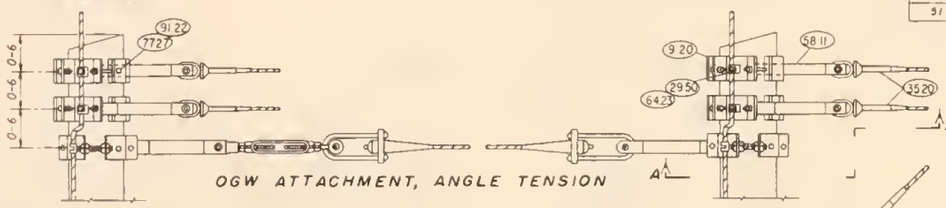
POST INSULATOR ASSEMBLY



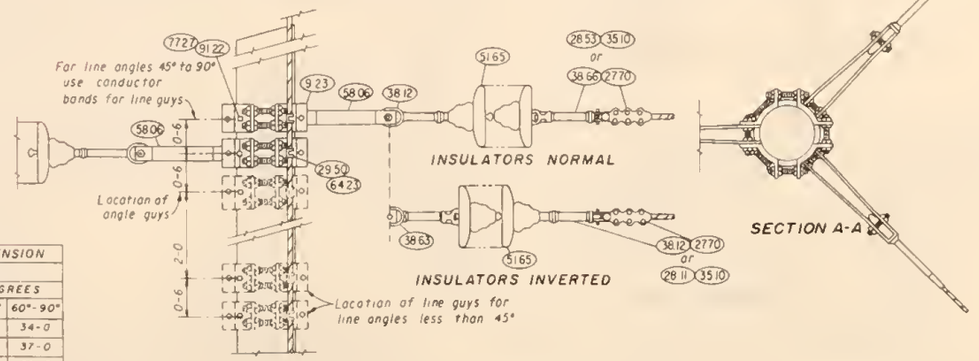
OGW ATTACHMENT, ANGLE SUSPENSION



OGW ATTACHMENT, TANGENT TENSION



OGW ATTACHMENT, ANGLE TENSION



DETAIL OF INSULATOR ATTACHMENT, SINGLE STRING

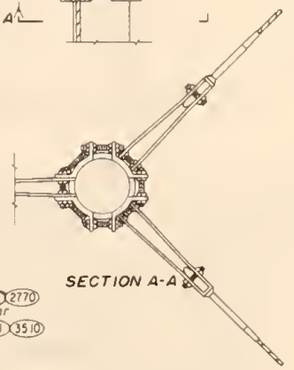


TABLE 1
HORIZONTAL LINE POST

PART NUMBER	VOLTAGE (KILOVOLT)	MINIMUM POSITIVE IMPULSE FLASHOVER (KILOVOLT)
5180	69	525
5181	115	695
5182	138	780
5183	161	945
5184	230	1105

TABLE 2
INSULATORS PER TENSION STRING

PART NUMBER	VOLTAGE KILOVOLT	INSULATORS PER STRING	TOTAL
5165	69	6	36
5165	115	9	54
5165	138	10	60
5165	161	11	66
5165	230	13	78

NOTES

1. Material required where horizontal line post insulators are used. Material based on ball sizes shown. Insulator may require bolts, locknuts, and washers of different sizes.
△ Anchor type shackle and 2¼" link not required when type B pole top band is used, see Dwg No 41 6035.
* For line angles up to and including 30°, use suspension clamp Part No 27 86.
* For line angles greater than 30° use large angle suspension clamp Part No 27 85.
** Use two lag screws and washers for each four-way strain band.

REFERENCE DRAWINGS

GROUNDING DETAILS 41 1012
STANDARD GUYING ARRANGEMENT FOR TYPE 3TA STRUCTURES 41 6055

STRUCTURE MATERIALS

PART NO	QUANTITY TANGENT	QUANTITY ANGLE	DESCRIPTION	DWG NO 41
1	3	3	Pole	
923	3	6	Band, four way, strain, Type B	6031
2950	3	6	Clip, ground ¾" x 2½" conehead bolt	6031
5806	3	6	Link, connecting, pair	6031
6423	3	6	Locknut for ¾" bolt	
7727	6	12	Lag screw, ½" x 4", teller drive thread	
9122	6	12	Washer, round, 1⅜" OD. 9/16" hole	
#	Grounding material, Part no's and Description shown on Drawing No 41 1012			

INSULATOR MATERIALS

PART NO	QUANTITY NORMAL INSTALLATION WITH STRAIN CLAMP	QUANTITY NORMAL INSTALLATION WITH COMP DE	QUANTITY INSULATORS INVERTED WITH STRAIN CLAMP	QUANTITY INSULATORS INVERTED WITH COMP CLAMP	DESCRIPTION	DWG NO 41
2770	6		6		Strain clamp with clevis fitting	
2811				6	Ball-Clevis, hot line type	
2853		6			Socket-Clevis, hot line type	
3510		6		6	Compression dead-end	
3812	6	6	6		Ball-oval eye, hot-line type	
3863			6	6	Socket-eye, hot line type, for ⅜" bolt	
3866	6				Socket-eye, hot line type, for ⅜" bolt	
5165	See Table 2				Insulator, suspension type, 10" dia, 5¾" spacing	
	69, 115, 138 KV		161, 230 KV			
1973	2				Bolt, machine ¾" x 14"	
1987			2		Bolt, machine ⅞" x 14"	
2721	1				Grounding clamp for ¾" bolt to No 2 AWG CWO	1012
2722			1		Grounding clamp for ⅞" bolt to No 4 AWG CWO	1012
2789	3		3		Clamp for line post insulator	
518	3		3		Horizontal line post insulator, see Table 1	
6423	6				Locknut for ¾" bolt	
6424			6		Locknut for ⅞" bolt	
9113	6				Lockwasher for ¾" bolt	
9114			6		Lockwasher for ⅞" bolt	
9157	6		6		Washer, square, curved 13/16" hole, 4"x4"x⅛"	

See Note 1

OVERHEAD GROUND WIRE MATERIALS

PART NO	TANGENT SUSPENSION	TANGENT TENSION	ANGLE SUSPENSION	ANGLE TENSION	DESCRIPTION	DWG NO 41
920	2	4	3	6	Bond, four way strain, Type A	6030
936 938 940	2				Bond, Pole top	6035, 6036, 6037
*△ 2789 OR 2788	2		2		Clamp, suspension with 2 1/8" link	
2940	2				Clip, ground ⅜"x1½" crg bolt	6035, 6036, 6037
2950	2	4	3	6	Clip, ground, ¾" x 2½" conehead bolt	6030
3520		4		4	Dead end compression type for OGW	
3530	2	2	2	2	Dead end, automatic vise type for guy strand, short bail	
5811	2	6	2	6	Link, connecting, pair	6030
6420	2				Locknut for ⅜" bolt	
6423	2	4	3	6	Locknut for ¾" bolt	
7542	2		2		Rod, armor, preformed, for ⅜" st strand	
7727	6	8	6	12	Lag screw, ½" x 14" felter drive thread	
△ 7910	2				Shackle, anchor type	6036, 6037
8232	As required				Steel strand 7/16", 7-wire, high strength	
8920	1	1	1	1	Turnbuckle, clevis-eye, ⅞" x 12"	BT-355
9122	4	8	6	12	Washer, round flat, 1⅜" OD 9/16" hole	
9310	2	2	2	2	Sheave wheel for 1⅛" strand	6030
7950			2		Shackle, twisted	6038

OVERHEAD GROUND WIRE IN SUSPENSION

VOLTAGE	2 ANGLE TURNED IN DEGREES 0°-60°	2 ANGLE TURNED IN DEGREES 60°-90°
69-KV	12-0	USE OGW IN TENSION
115-KV	14-0	
138-KV	16-0	
161-KV	20-0	
230-KV	25-0	

OVERHEAD GROUND WIRE IN TENSION

VOLTAGE	2 ANGLE TURNED IN DEGREES 0°-30°	30°-45°	45°-60°	60°-90°
69-KV	14-0	18-0	25-0	34-0
115-KV	16-0	20-0	27-0	37-0
138-KV	18-0	22-0	29-0	39-0
161-KV	20-0	24-0	31-0	41-0
230-KV	23-0	26-0	33-0	43-0

A 8-6-79 AE-NWS — ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

B 7-14-80 AE-NWS — REVISED REFERENCE DRAWING NUMBERS

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

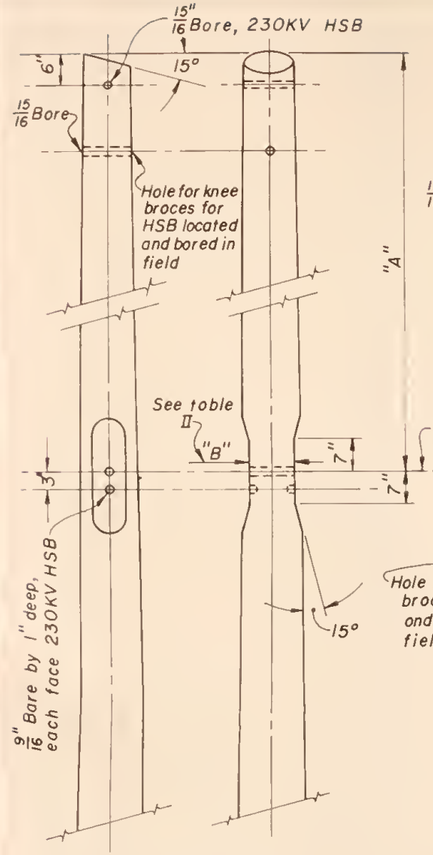
TRANSMISSION LINES

TYPE 3TA 69, 115, 138, 161 AND 230-KV 3-POLE TENSION STRUCTURE

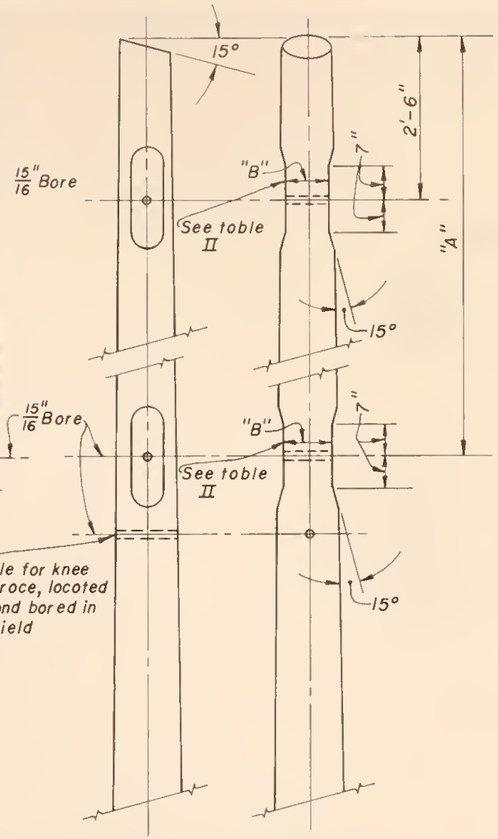
DESIGNED MJR — SUBMITTED Robert A. Bonnett
DRAWN BCM RA Brooks — RECOMMENDED David C. Hovey
CHECKED DDB-GAC — APPROVED L.D. Kekal, CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO SEPTEMBER 1, 1970 — E40-D-6311

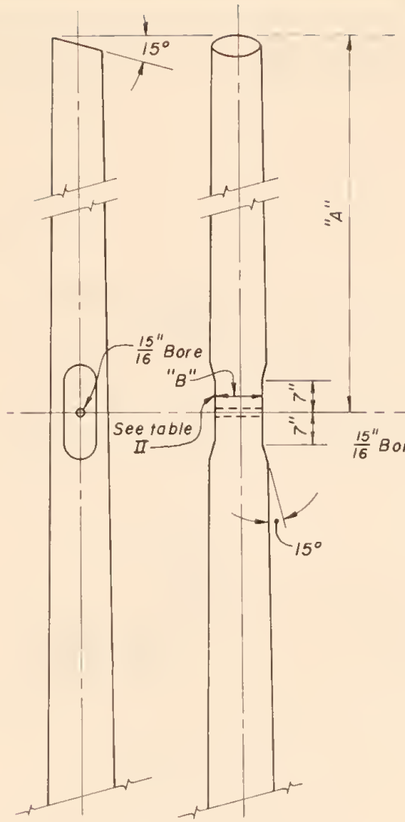
AUGUST 6, 1979 — 41 — 6018



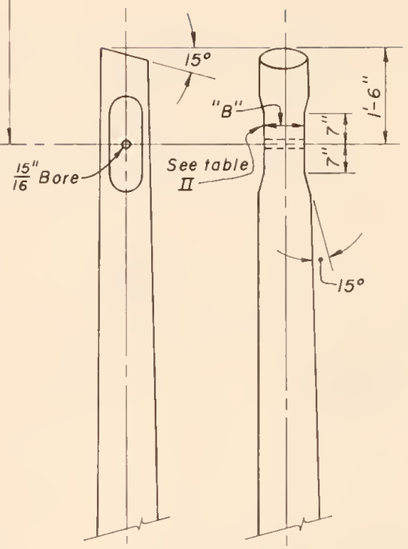
HS, AND HSB STRUCTURES
(See table I for dimension "A")



3AD STRUCTURES
(See table I for dimension "A")

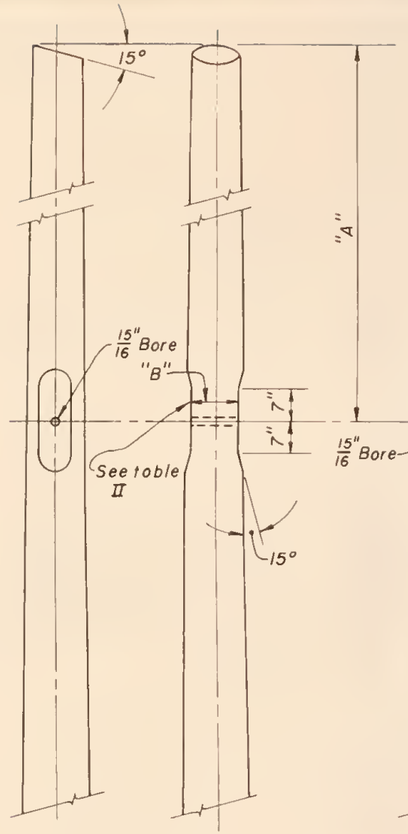


CENTER AND INSIDE POLES

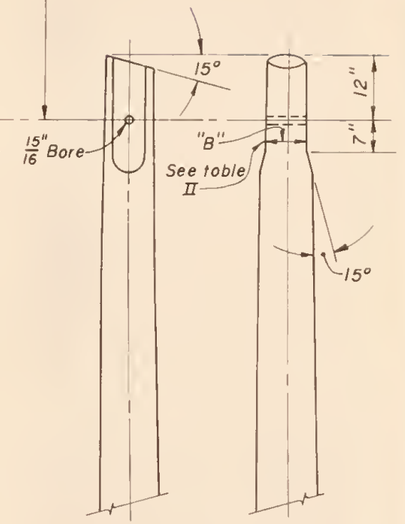


OUTSIDE POLES

3AC STRUCTURES
(See table I for dimension "A")



OUTSIDE POLES



CENTER POLE

3T AND 3TX STRUCTURES
(See table I for dimension "A")

TABLE I

TYPE OF STRUCTURE	DIMENSION "A"		
	138 KV.	161 KV.	230 KV
H S	7'-0"	8'-0"	——
HSB	7'-0"	8'-0	10-0
3AC	8'-6"	(-5688)	8'-6"
3AD	8'-6"	8'-6"	8'-6"
3T	10'-0GW Susp.	(-5690)	
	14'-6" " Tens.	"	
3TX	14'-6"	14'-6"	——

TABLE II

CIRCUMFERENCE OF POLE AT POINT OF GAIN	DIMENSION "B"
Under 25"	Goin 1/4" deep
25" to 27"	7 1/2"
27" to 30"	8"
30" to 35"	9"
35" to 40"	10 1/2"
40" to 45"	12"
45" and over	Goin 2" deep, Max.

NOTE

Opposite faces to be gained to same width and shall be parallel

A	8-6-79 A2-RM	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

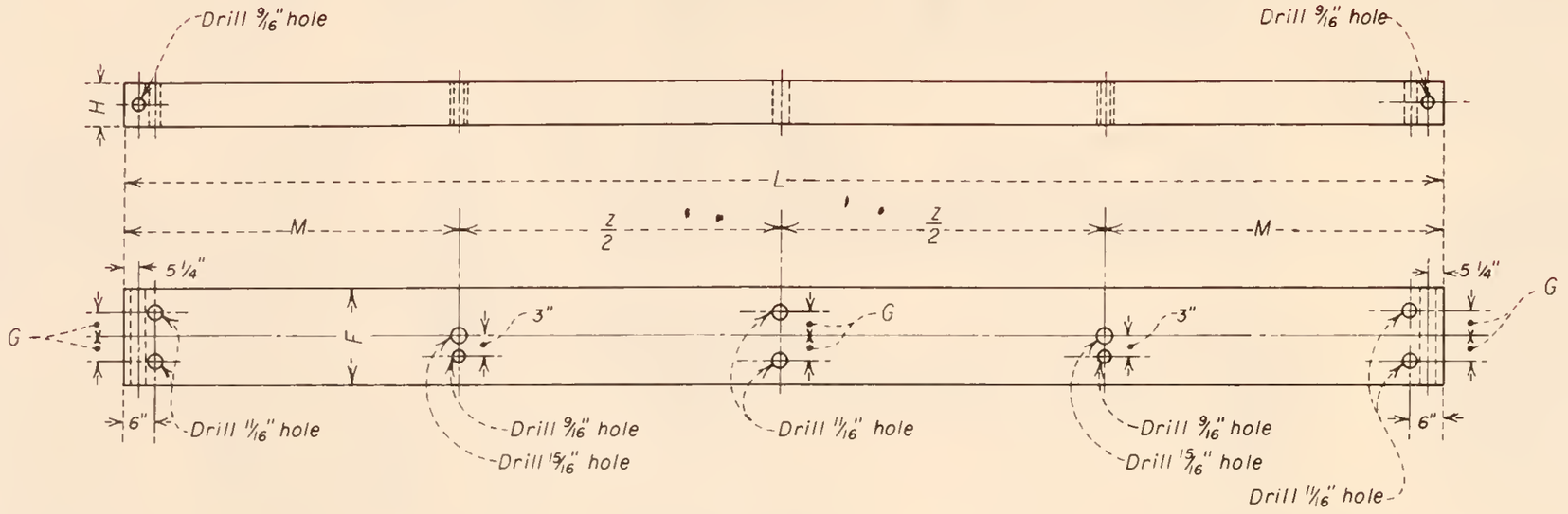
TRANSMISSION LINES
138, 161, & 230-KV 2&3 POLE STRUCTURES
DRILLING AND GAINING DETAILS WITH OVERHEAD GROUND WIRE

DESIGNED F.F.P. SUBMITTED
DRAWN RECOMMENDED
CHECKED A.E.D.-K.T.D. APPRDVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 25, 1978 | E40-D-5693

AUGUST 6, 1979 | 41 | 6024

16



Dimensions for Crossarms					
F*	G	H*	L	Z/2	M
9"	2 1/2"	3 1/8"	45'-0"	11'-0"	11'-6"
10 1/2"	3 3/16"	3 1/8"	45'-0"	11'-0"	11'-6"
11 1/2"	3 3/4"	3 5/8"	41'-0"	10'-0"	10'-6"

NOTES

*Minimum dimensions after laminating and surfacing

B	1-16-80 A2-AJL	REVISED TO SHOW VARIABLE DIMENSIONS
A	8-6-79 A2-RAG	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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WESTERN AREA POWER ADMINISTRATION

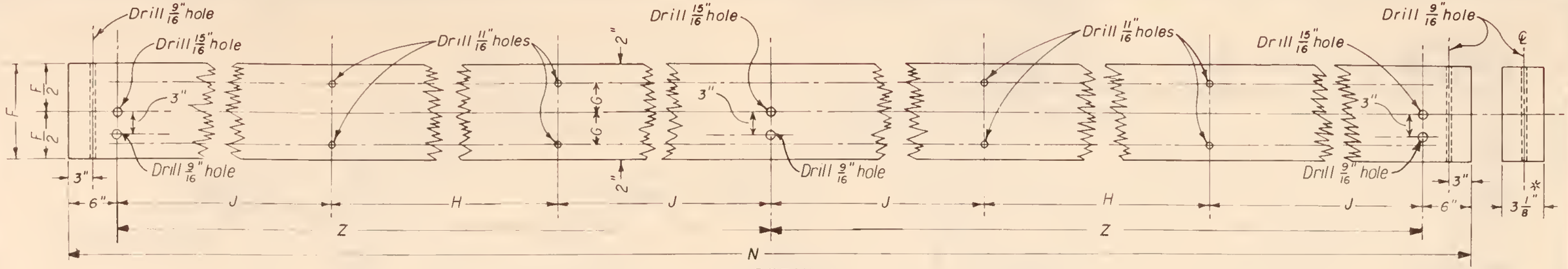
STANDARD DESIGNS

TRANSMISSION LINES
CROSSARM DRILLING DETAILS
230-KV HS AND HSB STRUCTURES

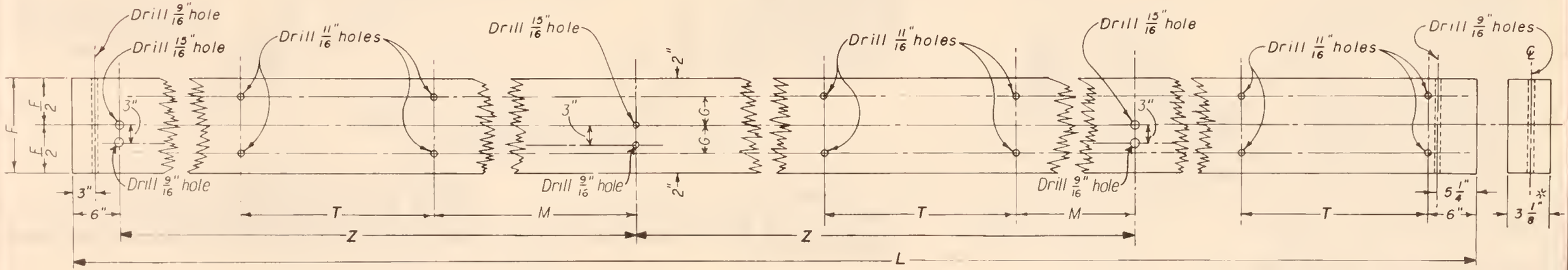
DESIGNED A.O.S. SUBMITTED
DRAWN W.W.M. RECOMMENDED
CHECKED C.A.C. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 25, 1978 | E40-D-5992

AUGUST 6, 1979 | 41 | 6027



DETAIL 1
UPPER CROSSARM DETAILS FOR 3AD STRUCTURES



DIMENSIONS FOR CROSSARMS								
F *	G	H	L	M	N	Z	J	T
9"	2 1/2"	10'-4"	56'-8"	16'-4"	49'-0"	24'-0"	6'-10"	1'-6"
10 1/2"	3 3/16"	7'-10"	51'-2"	12'-10"	43'-0"	21'-0"	6'-7"	2'-0"

*- Minimum dimensions after laminating and surfacing.

DETAIL 2
CROSSARM DETAILS FOR 3AC & 3AD STRUCTURES

Two crossarms per Detail 1, and two crossarms per Detail 2 required per type 3AD structure.

Two crossarms per Detail 2 required per type 3AC structure.

B	1-16-80 A2-PKE	REVISED TO SHOW VARIABLE DIMENSIONS
A	8-6-79 A2-PKE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

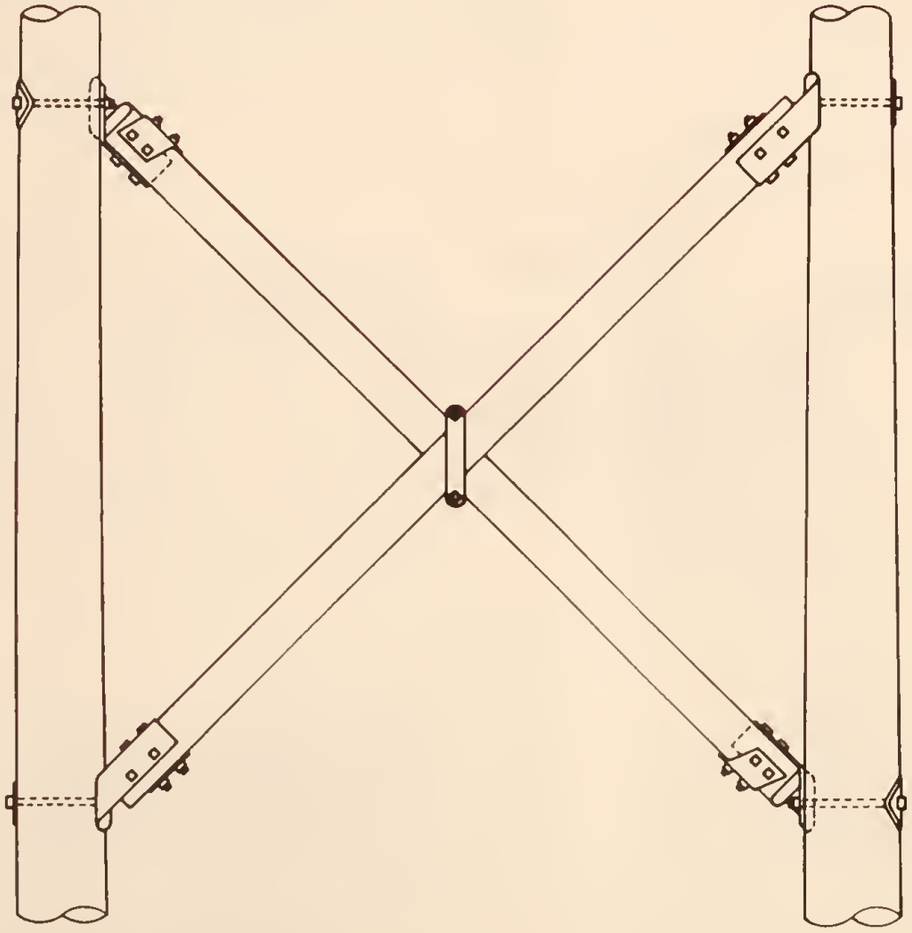
STANDARD DESIGNS
TRANSMISSION LINES
CROSSARM DRILLING DETAILS
230KV 3AC & 3AD STRUCTURES

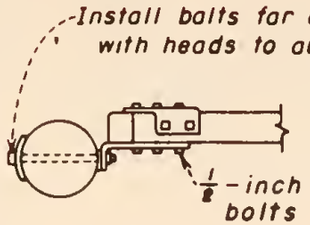
DESIGNED M.C. SUBMITTED
DRAWN W.G.C. RECOMMENDED
CHECKED C.A.C.-F.M.W. APPROVED
CHIEF, SUBS & T-LINE SECTION

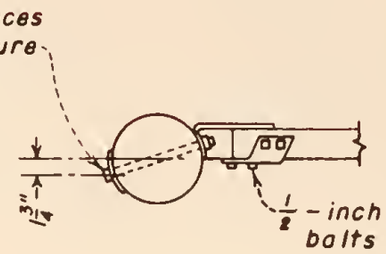
GOLDEN, COLORADO AUGUST 31, 1978 | E40-D-6191

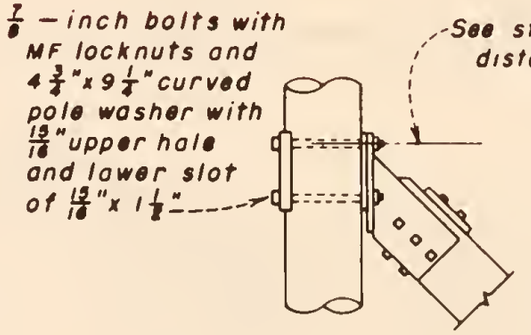
AUGUST 6, 1979 | 41 | 6028

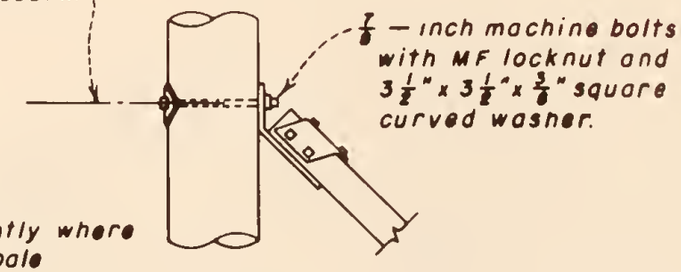
18








7/8 - inch bolts with MF locknuts and 4 3/4" x 9 1/4" curved pole washer with 15/16" upper hole and lower slot of 15/16" x 1 1/2"
See structure dwgs. for distance below crossarm



FOR 3TX (69 AND 115 KV.)
FOR 3T-1, 3T-2, 3TX (138 AND 161 KV.)
FOR 2 AND 3-POLE STRUCTURES (230 KV)
FOR 3TA (ALL KV)

FOR: 3AD (69 AND 115) KV
FOR 3T, 3T-1, 3T-2, 4S, 4S-1 (69 AND 115 KV.)
FOR 3T, 3AC, 3AD (138 AND 161 KV.)
FOR 2-POLE STRUCTURES (69, 115, 138 AND 161 KV.)

NOTES

End fittings and center clamp shall be made from 1/4 - inch minimum steel plate.

B	4-14-81 AE-[illegible]	ADDED 3TA STRUCTURE.
A	6-6-79 AE-[illegible]	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

X-BRACE DETAILS

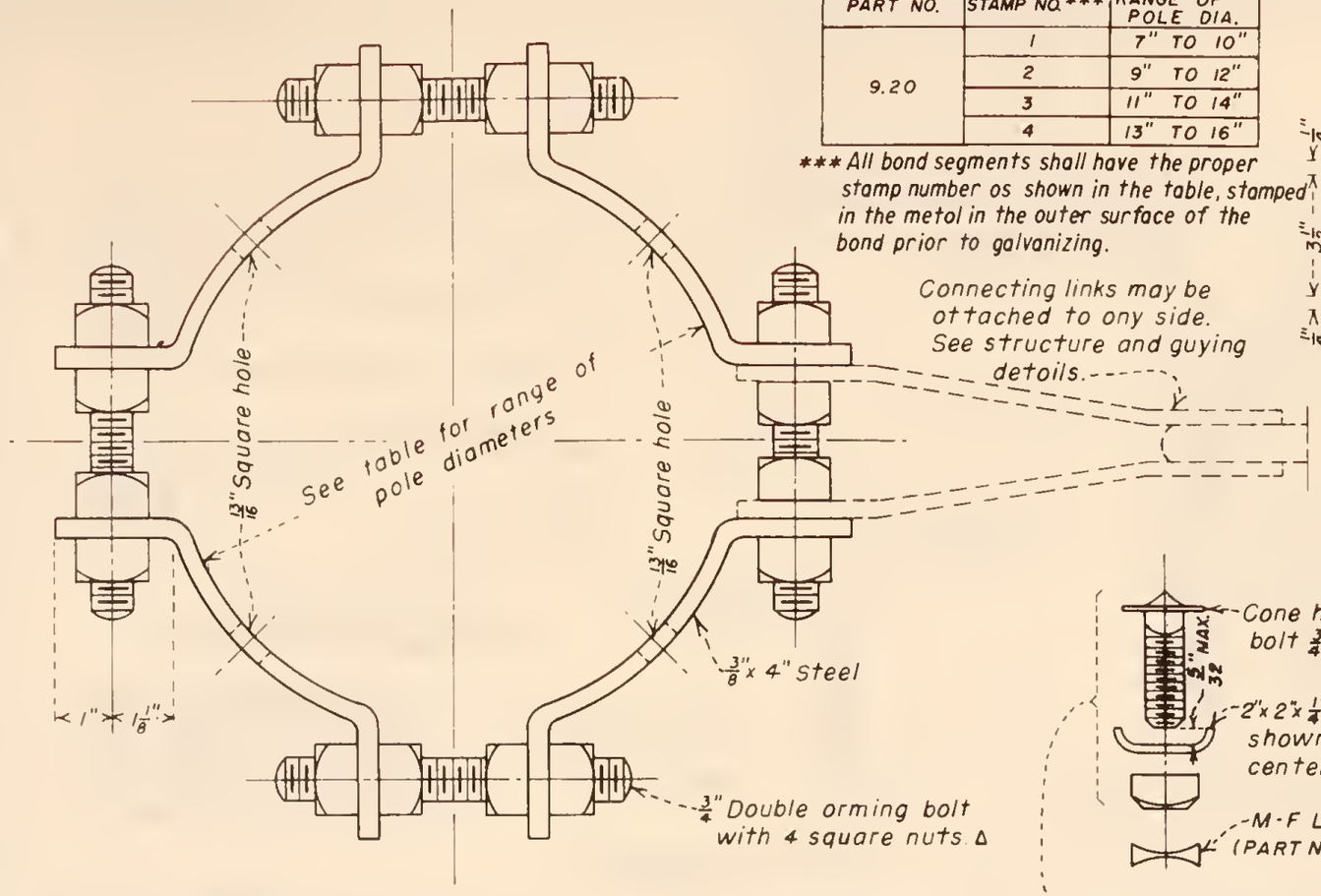
DESIGNED A.S. SUBMITTED [illegible]
DRAWN T.E.G. RECOMMENDED [illegible]
CHECKED C.A.C. APPROVED [illegible]
CHIEF, ELECTRICAL DESIGN BRANCH

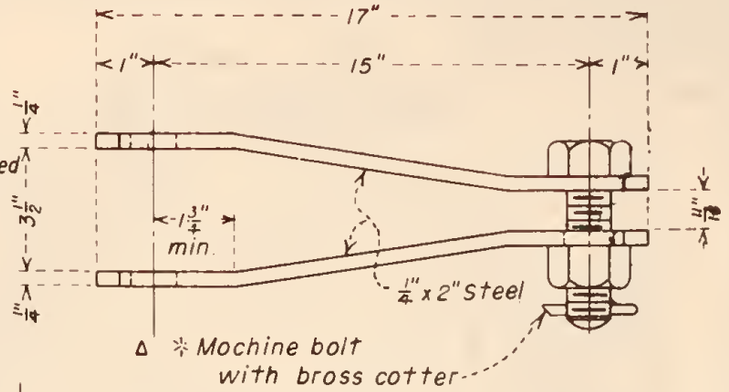
GOLDEN, COLORADO AUGUST 31, 1978 | E40-D-5923

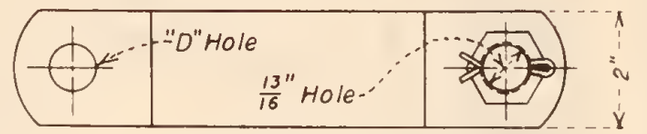
AUGUST 6, 1979 | 41 | 6029

PART NO.	STAMP NO.***	RANGE OF POLE DIA.
9.20	1	7" TO 10"
	2	9" TO 12"
	3	11" TO 14"
	4	13" TO 16"

*** All bond segments shall have the proper stamp number os shown in the table, stamped in the metol in the outer surface of the bond prior to galvanizing.


See table for range of pole diameters
13/16" Square hole
13/16" Square hole
3/8" x 4" Steel
1" x 1 1/8"
3/4" Double orming bolt with 4 square nuts. Δ
Connecting links may be attached to ony side. See structure and guying detoils.

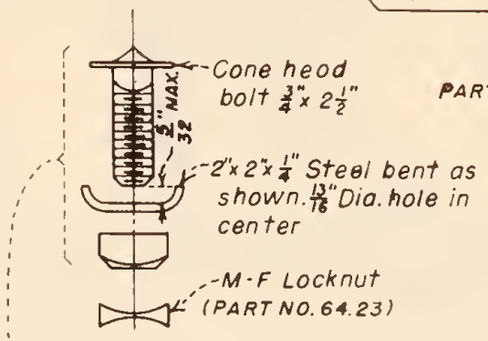




CONNECTING LINKS

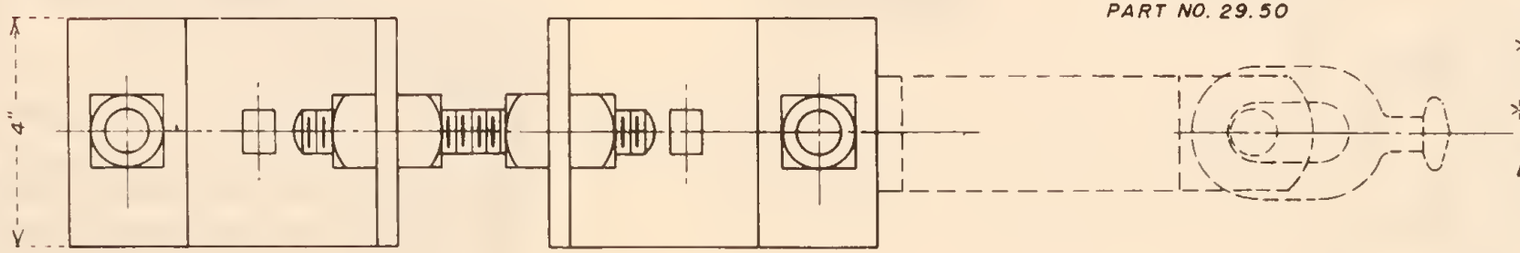
PARTS NO. 58.11, 58.12, 58.13 AND 58.13Ø

PART NO.	"D" INCHES	MACHINE BOLT
58.11	13/16	3/4" x 2 1/2"
58.12	13/16	3/4" x 3 1/2"
** 58.13	13/16	None
58.130	15/16	3/4" x 2 1/2"



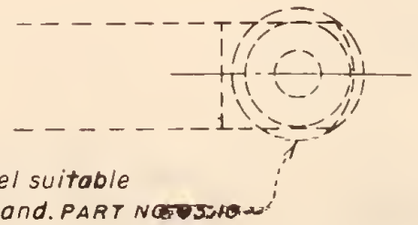
GROUND CLIP

PART NO. 29.50



FOUR-WAY STRAIN BAND

PART NO. 9 20



NOTES

All moterial sholl be golvanized ofter drilling and bending, in accordance with A.S.T.M. Designation A 153.

* Machine bolt to be included with Parts No. 58.11 and 58.12 only.

** Part No. 58.13 to be used with OGW dead-ends only.

Δ Bolts sholl be new-rolled, open-hearth class B steel conforming to Federol Spec. FF-B-575C type I grade 2.

A	B-6-79	ADDED WAPA DRAWING NUMBER AHD
	A2-	REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

TYPE A FOUR-WAY STRAIN BAND

DESIGNED A.R.M. SUBMITTED

DRAWN E.J.H. — J.F.S. RECOMMENDED

CHECKED A.J.E. — M.H.K. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 16, 1978 | E40-D-3667

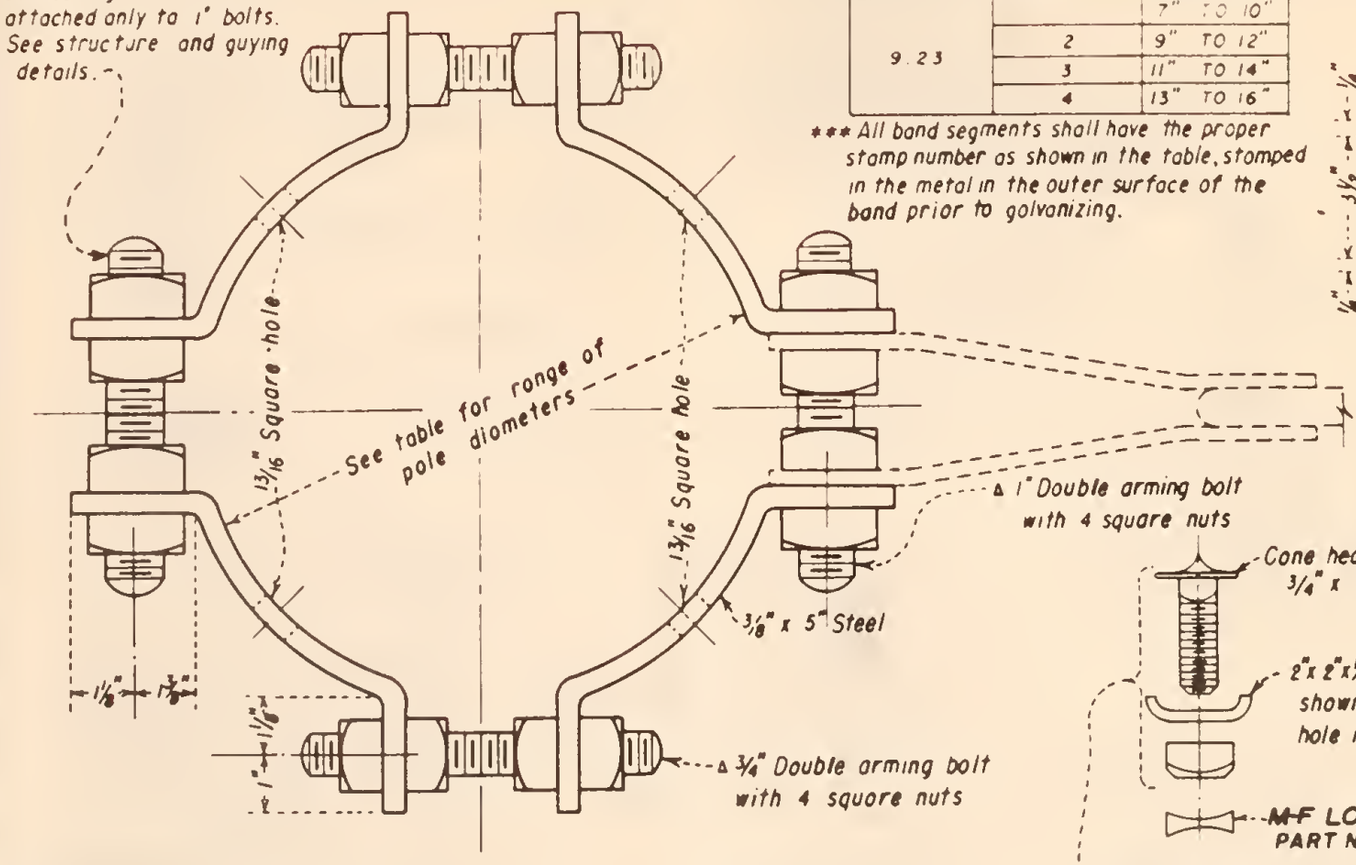
AUGUST 6, 1979 | 41 | 6030

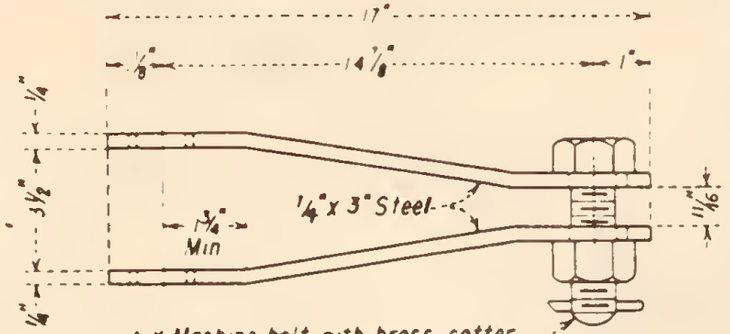
20

Connecting links shall be attached only to 1" bolts. See structure and guying details.

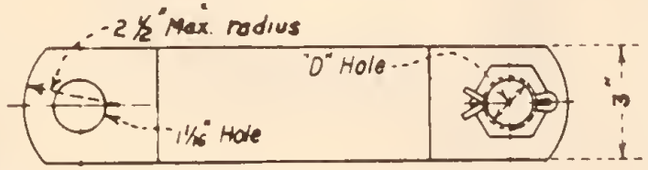
PART NO	STAMP NO ***	RANGE OF POLE DIA
9.23		7" TO 10"
	2	9" TO 12"
	3	11" TO 14"
	4	13" TO 16"

*** All band segments shall have the proper stamp number as shown in the table, stamped in the metal in the outer surface of the band prior to galvanizing.

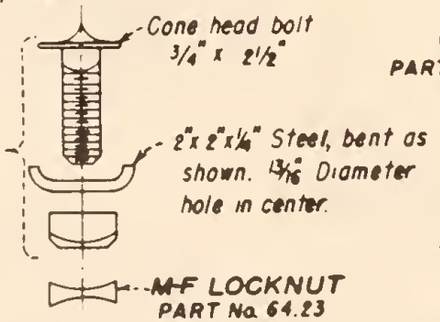

13/16" Square hole
See table for range of pole diameters
13/16" Square hole
3/8" x 5" Steel
1 1/8"
1 1/8"
1"
1"
Δ 3/4" Double arming bolt with 4 square nuts
Δ 1" Double arming bolt with 4 square nuts



Δ * Machine bolt with bross cotter



CONNECTING LINKS
PARTS No. 58.06, 58.07 AND 58.08


Cone head bolt 3/4" x 2 1/2"
2" x 2" x 1/4" Steel, bent as shown. 13/16" Diameter hole in center.
M-F LOCKNUT PART No. 64.23
GROUND CLIP PART No. 29.50

PART No.	"D" INCHES	MACHINE BOLT
58.06	13/16	3/4" x 2 1/2"
58.07	13/16	3/4" x 3 1/2"
** 58.08	13/16	None

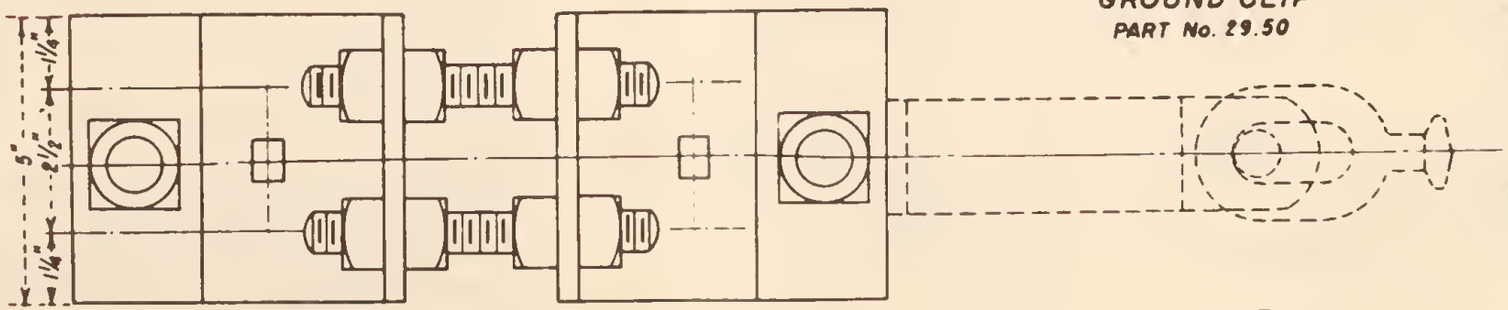
NOTES

All material shall be galvanized after drilling and bending in accordance with A.S.T.M. Designation A153

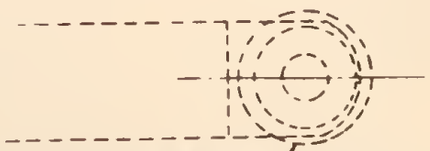
*Machine bolt to be included with Parts No. 58.06 and 58.07 only.

**Part No. 58.08 to be used with O.G.W. dead-ends only.

ΔBolts shall be new-rolled open hearth Class B steel conforming to Federal Specification FF-B-575C type I grade 2.



FOUR-WAY STRAIN BAND
PART No. 9.23



2 1/2" Sheave wheel suitable for 7/16" dia. strand. PART No. 93.10

A	8-6-79 A2-	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

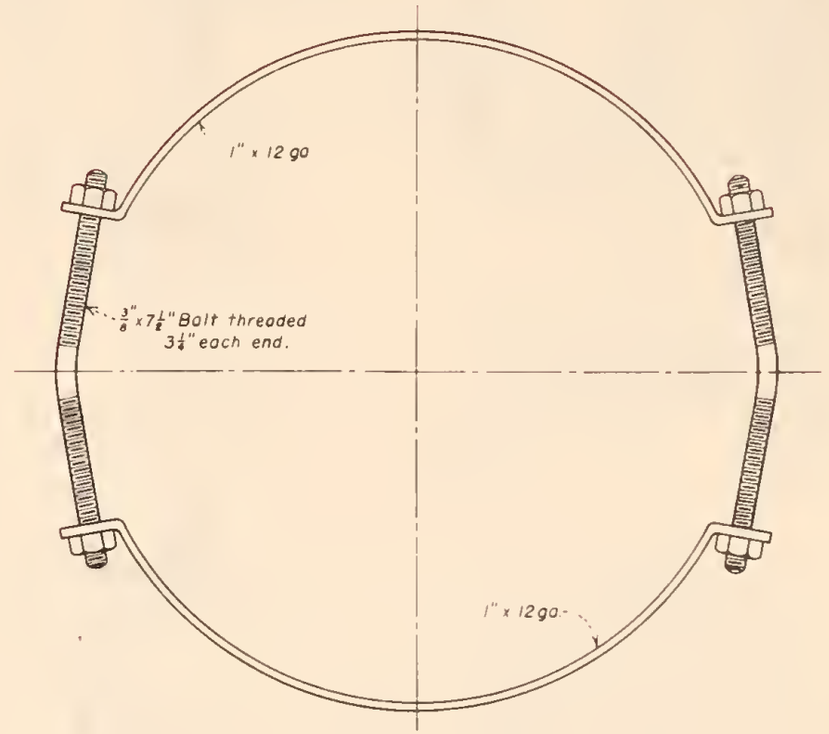
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
STANDARD DESIGNS

TRANSMISSION LINES
TYPE B FOUR-WAY STRAIN BAND

DESIGNED G.R.W. SUBMITTED
DRAWN E.J.M. RECOMMENDED
CHECKED K.J.B.-D.C.M. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1978 | E40-D-5186

AUGUST 6, 1979 | 41 | 6031



NOTES

To be adaptable to 7 1/2" to 10" pole taps.
Galvanize after bending and drilling in accordance with A.S.T.M. designation A-153-49

THIS DRAWING SUPERSEDES DWG 40-D-8009

A	E-8-79 AZ-[illegible]	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES
POLE TOP BAND-PLAIN

DESIGNED R.E.S. SUBMITTED [signature]
DRAWN [illegible] RECOMMENDED [signature]
CHECKED R.E.S. APPROVED [signature]
Chief, Systems Engineering Branch

GOLDEN, COLORADO AUGUST 16, 1979 | E40-D-2781

AUGUST 6, 1979 | 41 | 6032

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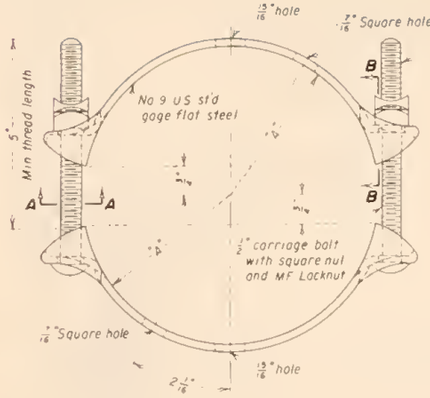
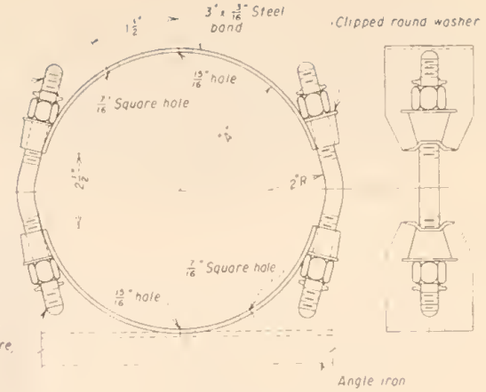
22

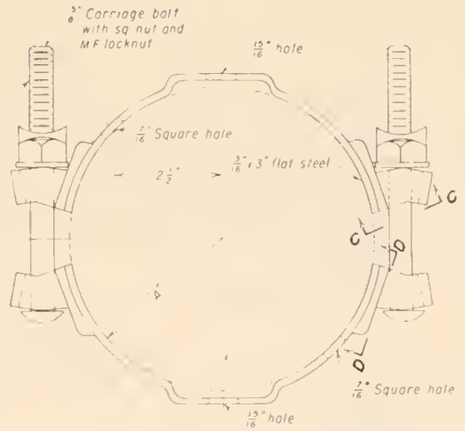


Bolts shall be new-rolled open-hearth Class B steel conforming to Federal Specification FF-B-571a except that the minimum tensile strength may be 55,000 lbs per sq inch



1/2" - Bolt, rolled thread each end, heavy hex nuts and hex MF locknuts, annealed Bolt shall not interfere with angle

PART NO 943, 944, or 945

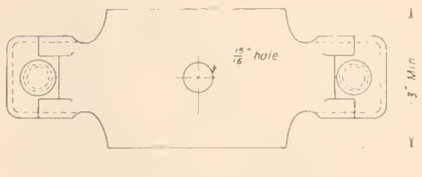


PART NO	RADIUS "A"	RANGE OF POLE DIA	STAMP NO ±
943	4	7" to 9"	1
944	4 3/8"	8 1/2" to 11"	2
945	5 3/4"	10 1/2" to 13"	3

NOTES

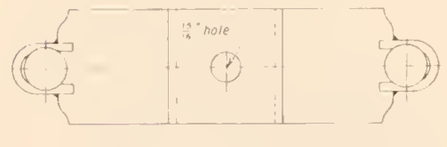
All material shall be galvanized after drilling and bending, in accordance with A.S.T.M. Designation A-153.

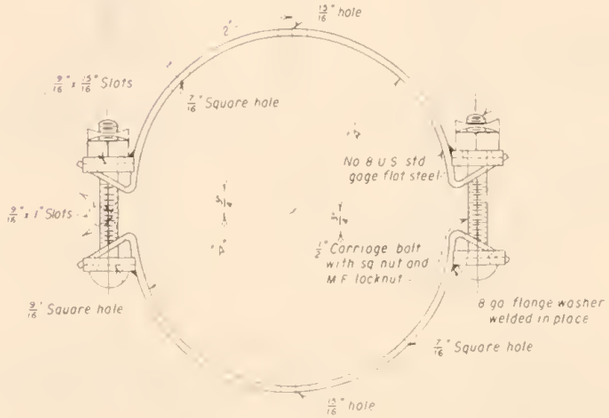
± Both sections of the band shall have the proper stamp number as shown in the table, stamped in the metal on the outside surface of the band prior to galvanizing, or may be stamped after galvanizing, with a suitable indelible ink



PART NO 943, 944, or 945

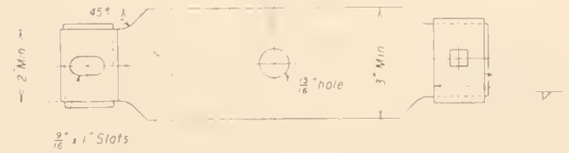
Bolts shall be new-rolled open-hearth Class B steel conforming to Federal Specification FF-B-571a except that the minimum tensile strength may be 55,000 lbs per sq inch



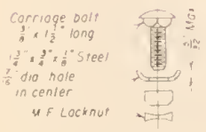

15/16" hole
2"
9/16" x 15/16" Slots
7/16" Square hole
No 8 U.S. std gage flat steel
9/16" x 1" Slots
1/2" Carriage bolt with sq nut and MF locknut
8 ga flange washer welded in place
9/16" Square hole
7/16" Square hole
15/16" hole

PART NO 943, 944 or 945

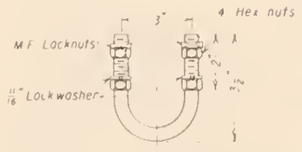
PART NO 943, 944, or 945



PART NO 943 944 or 945



GROUND CLIP



5/8" "U" BOLT

A 10-6-79 ADDED WAPA DRAWING NUMBER AND 12-[illegible] REVISED TITLE BLOCK

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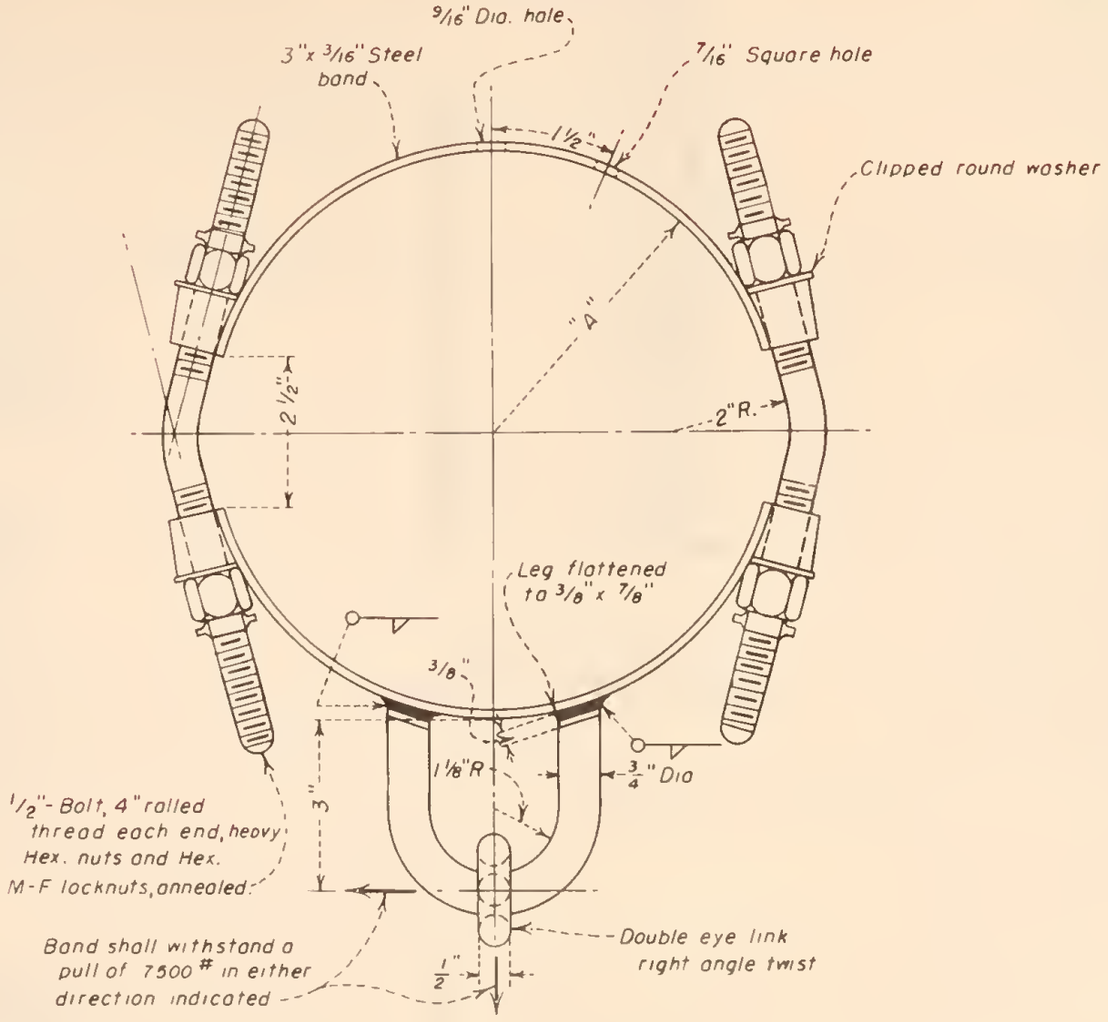
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

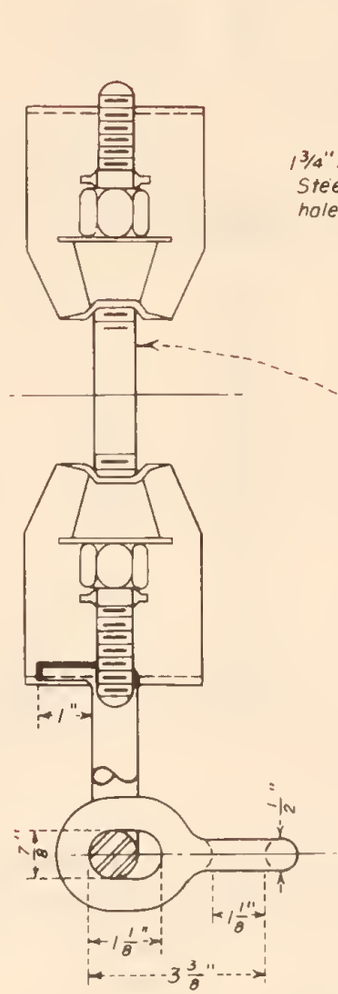
STANDARD DESIGNS

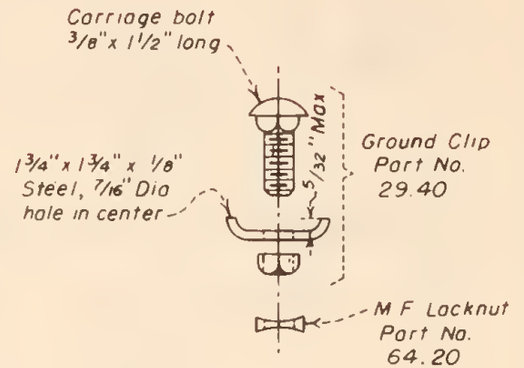
TRANSMISSION LINES
POLE TOP BANDS FOR OVERHEAD GROUND WIRES

DESIGNED	A.D.S.	SUBMITTED	[signature]
DRAWN	L.N.M.	RECOMMENDED	[signature] for
CHECKED	C.A.C.-E.M.M.	APPROVED	[signature] CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO	SEPTEMBER 7, 1978	E40-D-5994
AUGUST 6, 1979	41	6033






Carriage bolt 3/8" x 1 1/2" long
1 3/4" x 1 3/4" x 1/8" Steel, 7/16" Dia hole in center
5/32" Max
Ground Clip Part No. 29.40
M F Lacknut Part No. 64.20
Bolts shall be new-rolled, open hearth, class B steel conforming to Federal Specification FF-B-571a except that the minimum tensile strength may be 55,000 lb. per square inch.

PART No.	STAMP No ☼	RADIUS "A"	RANGE OF POLE DIA.
9.38	1	4"	7" to 9"
9.39	2	4 3/4"	8 1/2" to 11"
9.40	3	5 3/4"	10 1/2" to 13"

NOTES

All material shall be galvanized after drilling and bending, in accordance with A.S.T.M. Designation A153.

☼ Both sections of the band shall have the proper stamp number, as shown in the table, stamped in the metal on the outside surface of the band prior to galvanizing, or may be stamped after galvonizing, with a suitable indelible ink

Not to be used for dead-ending overhead ground wires.

Band is similar to Joslyn Mfg and Supply Co design.

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

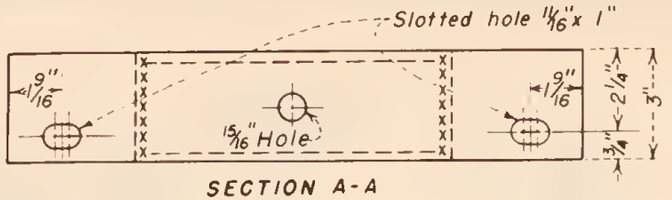
STANDARD DESIGNS

TRANSMISSION LINES
TYPE B POLE TOP BAND FOR OVERHEAD GROUND WIRE

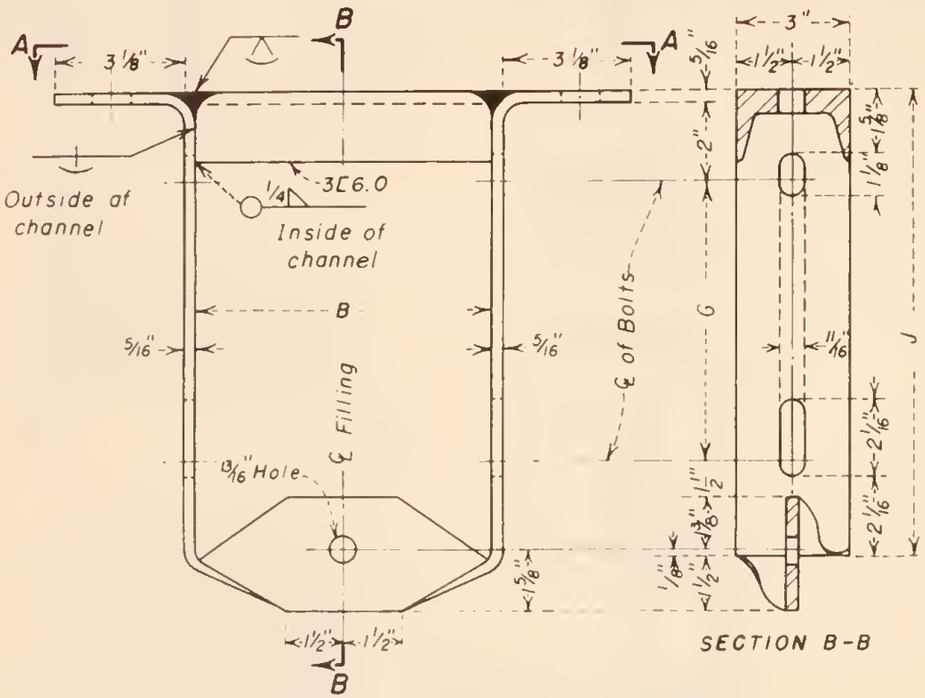
DESIGNED E.E.P. SUBMITTED R.E. Gimpleson
DRAWN P.V. RECOMMENDED D.P. Turney
CHECKED T.M.A. - M.H.K. APPROVED L.H. Schraft
CHIEF, ELECTRICAL DESIGN BRANCH

A	8-6-79 A2-[illegible]	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK	GOLDEN, COLORADO AUGUST 16, 1978	E40-D-4837
			AUGUST 6, 1979	41	6035

24

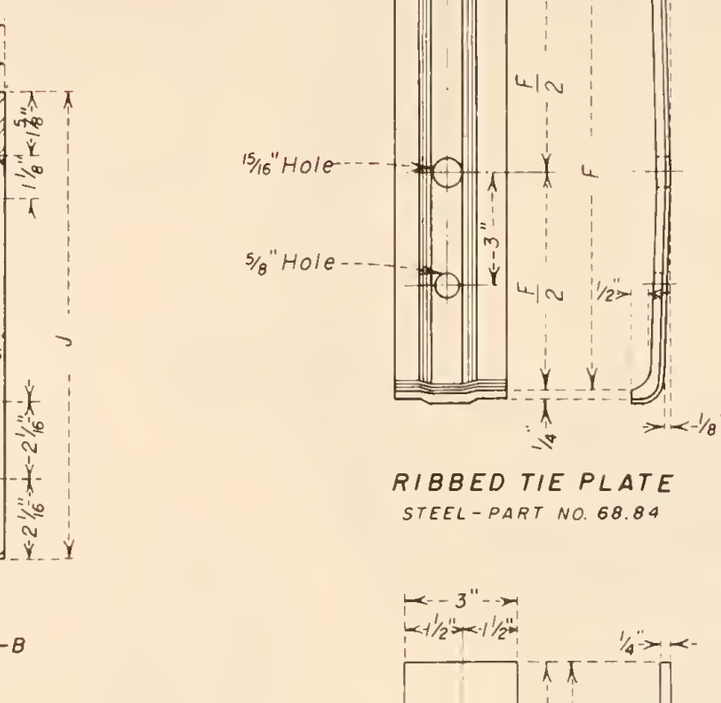


SECTION A-A

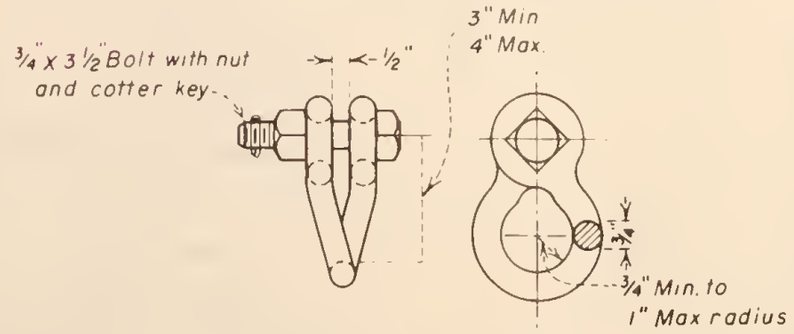


PHASE FITTING WITH 3" CHANNEL

STEEL - PART NO 40.66, 40.67 AND 40 68 (SEE TABLE)

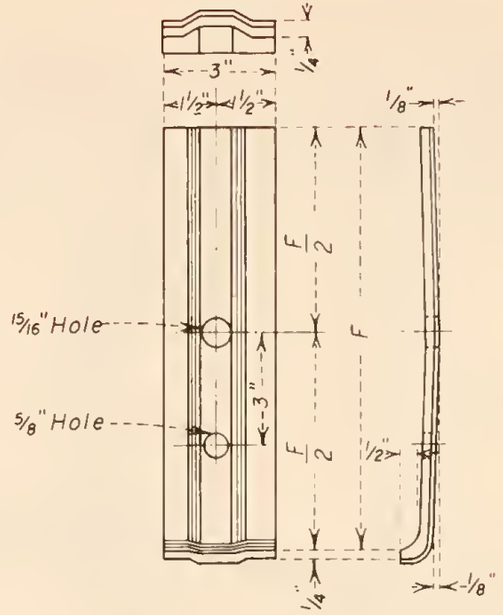


SECTION B-B



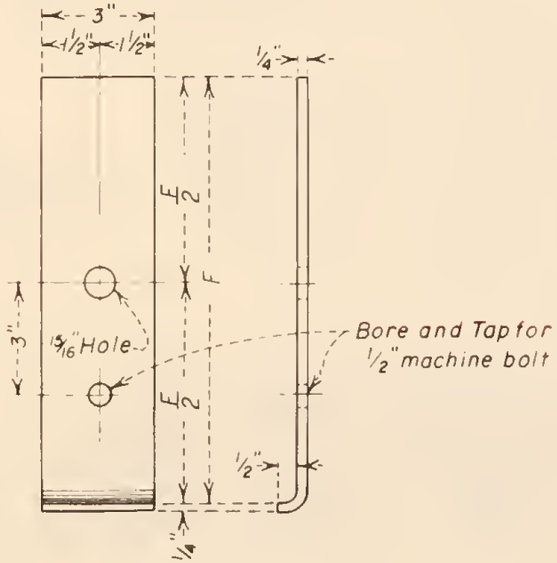
TWISTED SHACKLE

STEEL - PART NO 79 50



RIBBED TIE PLATE

STEEL - PART NO. 68.84



FLAT GAIN PLATE

STEEL - PART NO 68.32

PART NO.	B INCHES
40 66	9
40 67	10 1/2
40.68	12

NOTE

All material shall be galvanized after drilling, bending, and forging in accordance with A.S.T.M. designation A153.

Crossarm Depth F	G	J
9"	5"	9 5/16"
10 1/2"	6 1/2"	11 1/16"
11 1/2"	7 1/2"	12 1/16"

B	1-16-80 A2- RLG	REVISED TO SHOW VARIABLE DIMENSIONS
A	8-6-79 A-2 RLG	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK.

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UNITED STATES DEPARTMENT OF ENERGY

WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

230-KV H-FRAME

POLE HARDWARE DETAILS

DESIGNED A.D.S. SUBMITTED

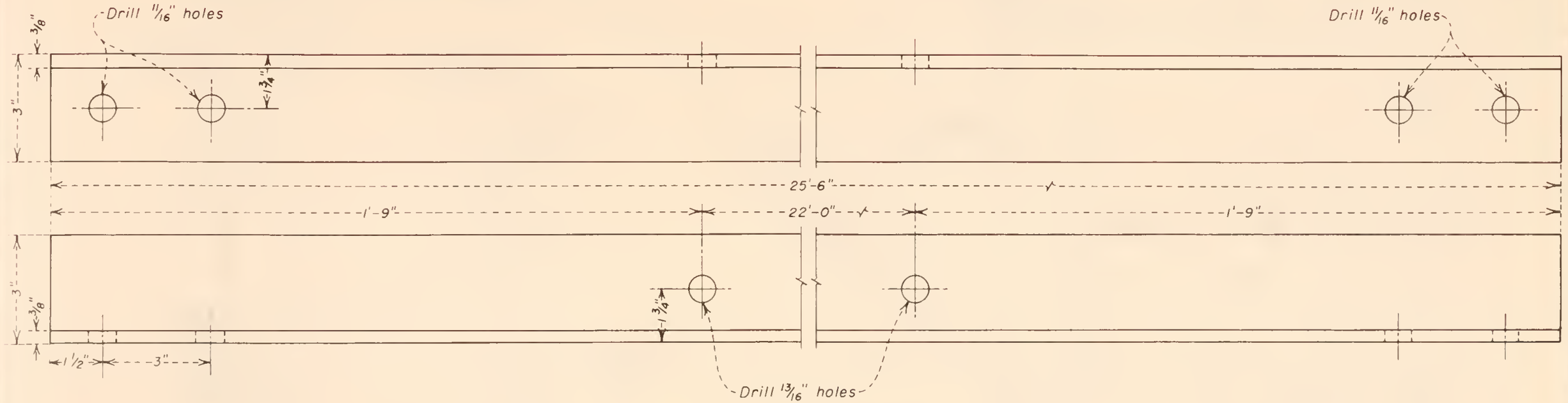
DRAWN R.C.C. RECOMMENDED

CHECKED C.A.C.-F.N.W. APPROVED

CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 25, 1978 | E40-D-5991

AUGUST 6, 1979 | 41 | 6040



NOTES

All material shall be galvanized after drilling in accordance with A S T M. Designation A153.

A	8-6-79 A2-MT2	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK **SAFETY**

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

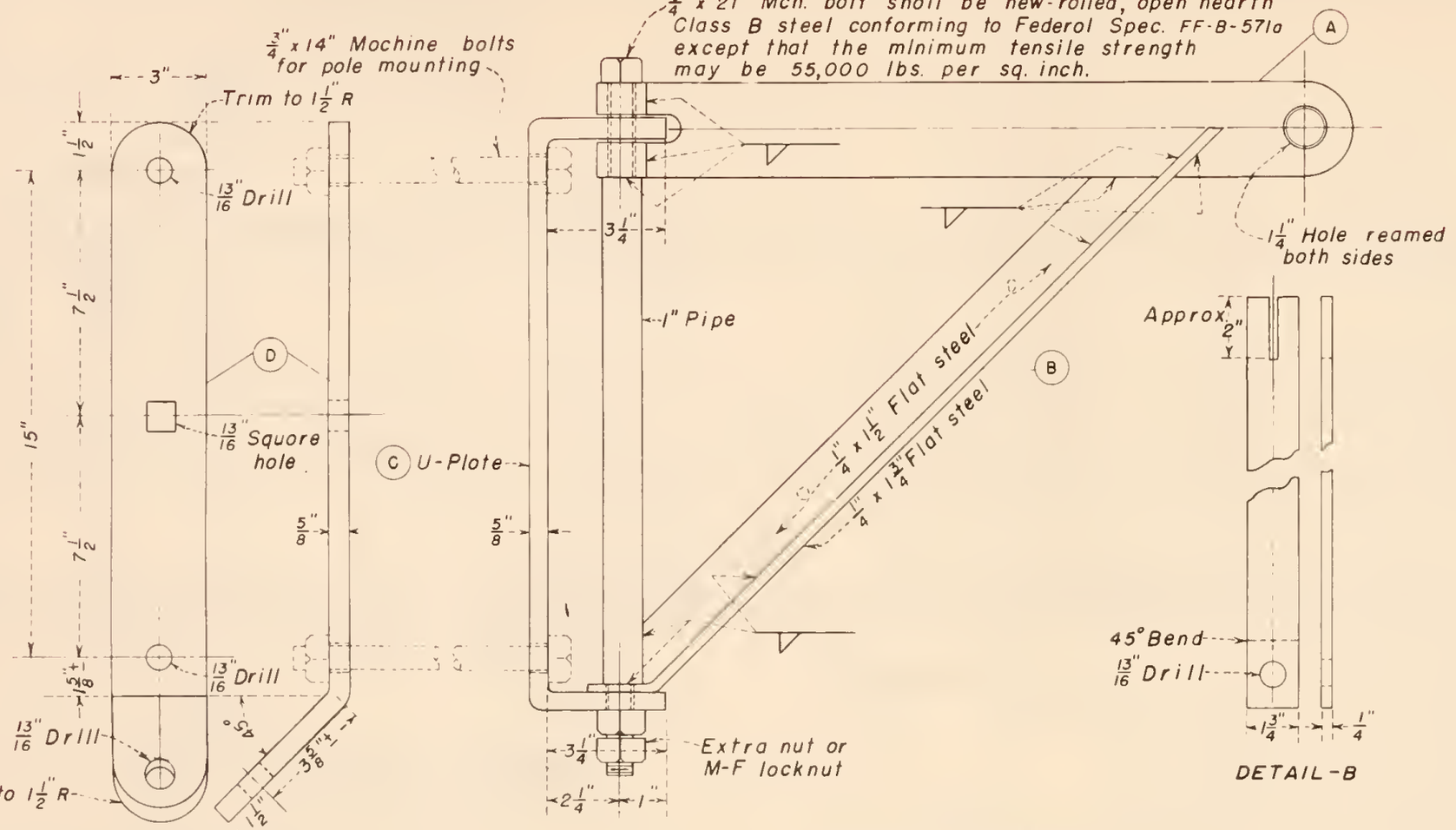
STANDARD DESIGNS
TRANSMISSION LINES
230KV H-FRAME
ANGLE IRON DETAILS

DESIGNED A D S — SUBMITTED
DRAWN W W M — RECOMMENDED
CHECKED C A C - F M W — APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 31, 1978 | E40-D-5993

AUGUST 6, 1979 | 41 | 6041

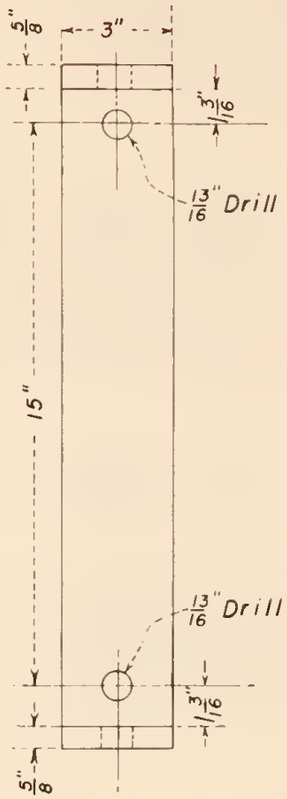
26



GUY PLATE
DETAIL-D

BRACKET ASSEMBLY

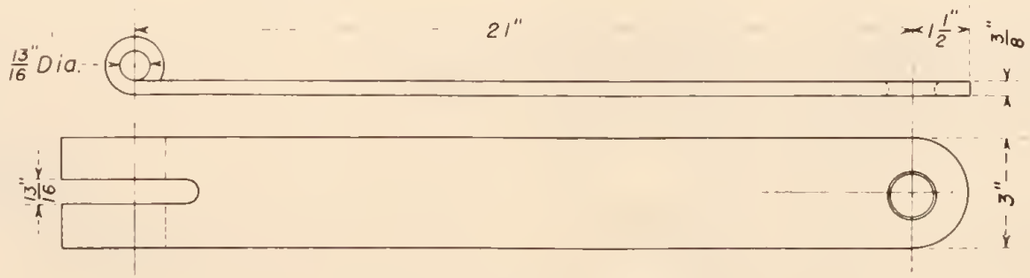
DETAIL-B



U-PLATE
DETAIL-C

NOTES

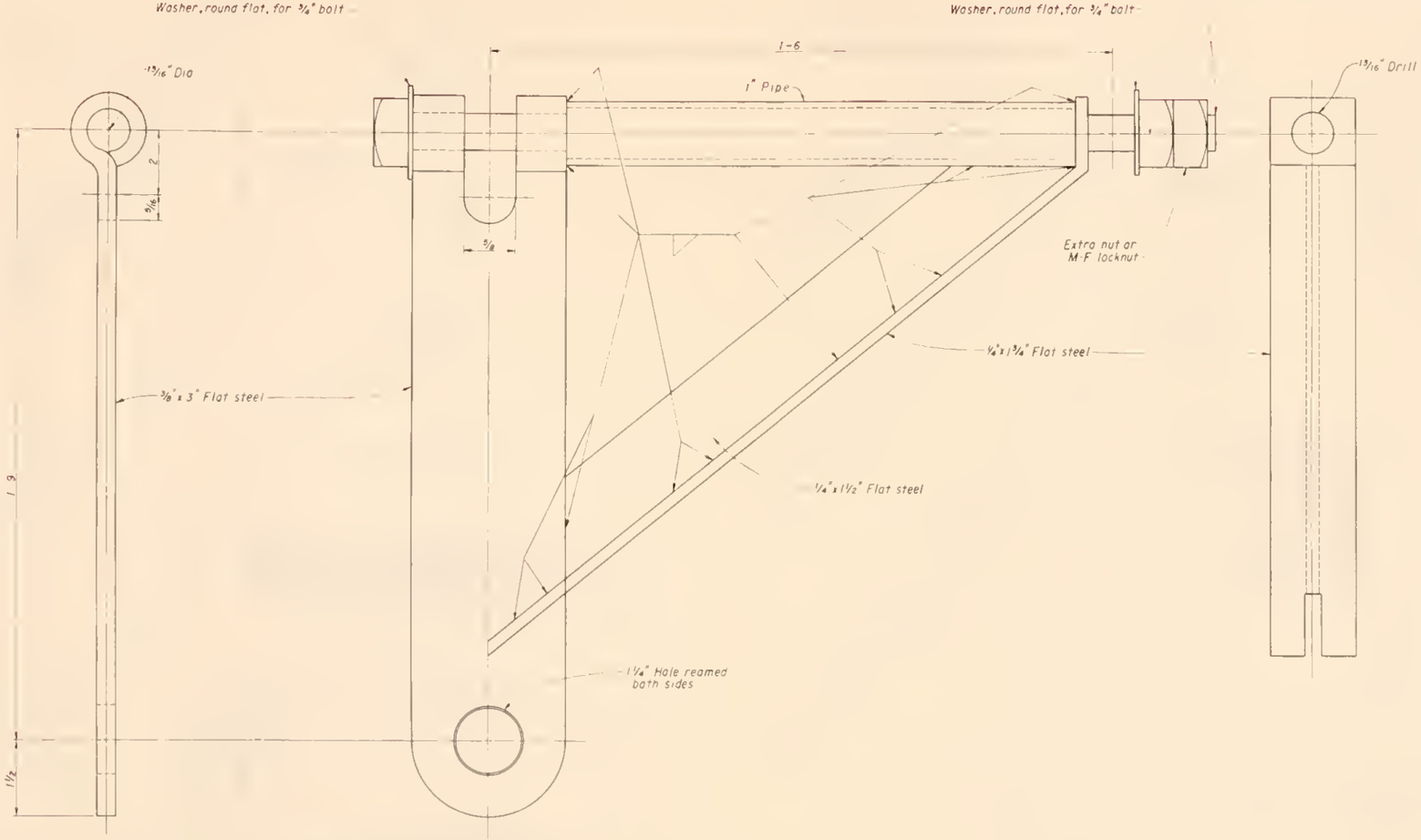
All materiol shall be galvanized after drilling and bending, in accordance with A.S.T.M designation A153.
Bracket is similar to Hughes Brothers design.



EXTENSION PLATE
DETAIL-A

A 8-6-79 A2-ME	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK	
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF ENERGY WESTERN AREA POWER ADMINISTRATION		
STANDARD DESIGNS TRANSMISSION LINES SWINGING ANGLE BRACKET		
DESIGNED E.V.-M.C. SUBMITTED DRAWN G.H.B. RECOMMENDED CHECKED K.T.D-D.C.M. APPROVED CHIEF, ELECTRICAL DESIGN BRANCH		
GOLDEN, COLORADO AUGUST 23, 1978		E40-D-5719
AUGUST 6, 1979	41	6045

3/4" x 22" Machine bolt shall be new-rolled open hearth Class B steel conforming to Federal Spec FF-B-5710 except that the minimum tensile strength may be 55,000 lbs per sq inch



PART NUMBER 23.13

NOTE

Bracket is similar to Hughes Brothers, Inc stock No 28218

A	8-6-79 A2-AFE	ADDED W A P A DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

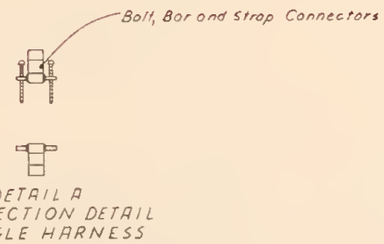
SWINGING ANGLE BRACKET FOR TYPE 3AC AND 3AD 230-KV STRUCTURES

DESIGNED: [illegible] SUBMITTED: [illegible]
DRAWN: D.E. Buckland RECOMMENDED: [illegible]
CHECKED: [illegible] APPROVED: [illegible]
CHIEF, ELECTRICAL DESIGN BRANCH

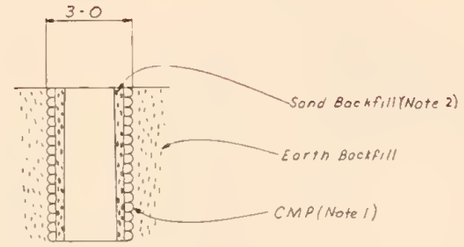
GOLDEN COLORADO — SEPT. 7, 1978 — E40-D-6452

NOVEMBER 15, 1979 — 41 — 6046

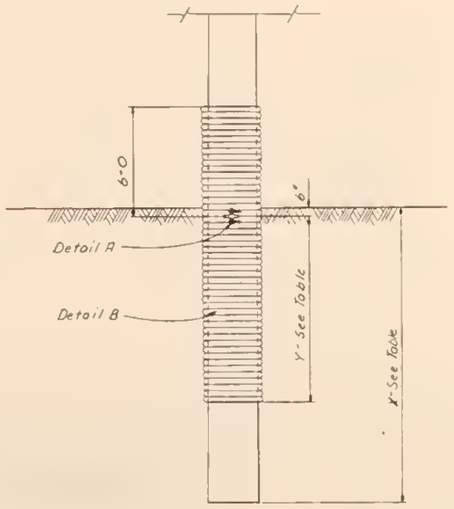
28



DETAIL A
CONNECTION DETAIL
SINGLE HARNESS



DETAIL "B"
BACKFILL DETAILS



Pole Length	X	Y
55-0	12-0	6-6
60-0	12-6	7
65-0	13-0	7-6
70-0	13-6	8-0
75-0	14-0	8-6
80-0	14-6	9-0
85-0	15-0	9-6
90-0	15-6	10-0
95-0	16-0	10-6

NOTES

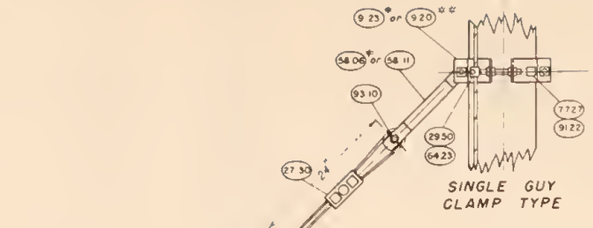
1 Corrugated metal pipe, including coupling bands, shall be in accordance with Federal Specification WW-P-405B, Class I or II, series A, shape 1. Pipe ends shall be beveled where required
2 Sand backfill shall extend to top of CMP
3 CMP shall be in two sections coupled together as shown in Detail "A"

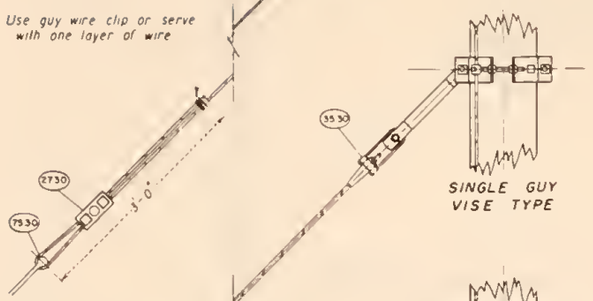
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

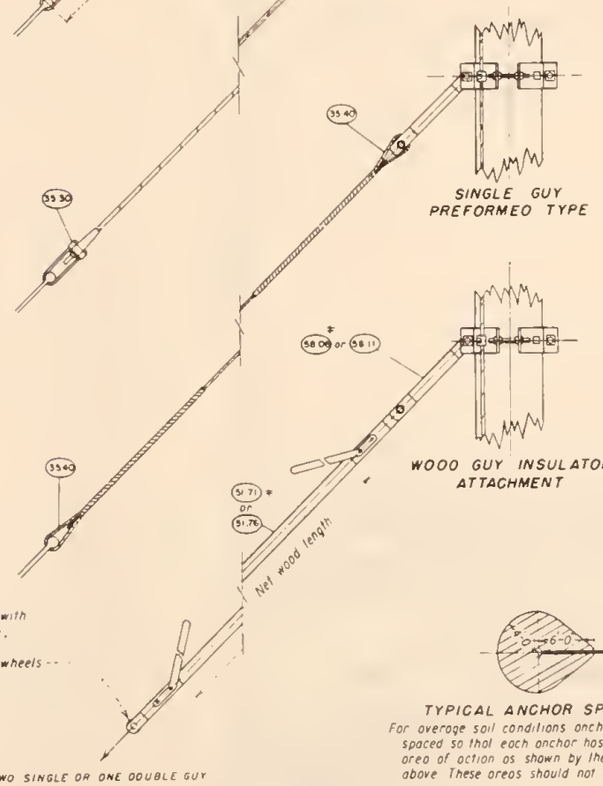
TRANSMISSION LINE STANDARD
CMP-TYPE CASING FOR SETTING WOOD POLES

DESIGNED T. A. Cook — RECOMMENDED Everett D. Feeney
DRAWN Evan C. Glenn — APPROVED E. C. Cabot
CHECKED A. J. Linnabary — DIRECTOR, DIVISION OF ELECTRICAL DESIGN

JANUARY 17, 1980	41	9014

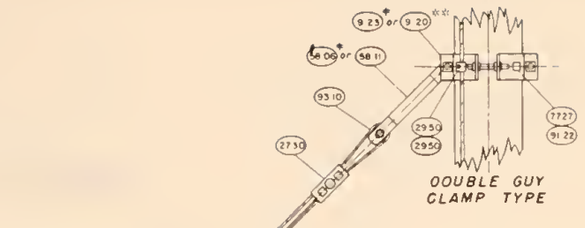


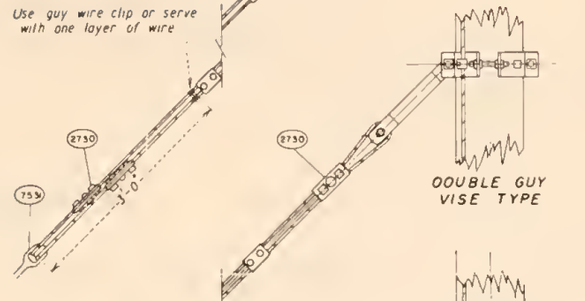


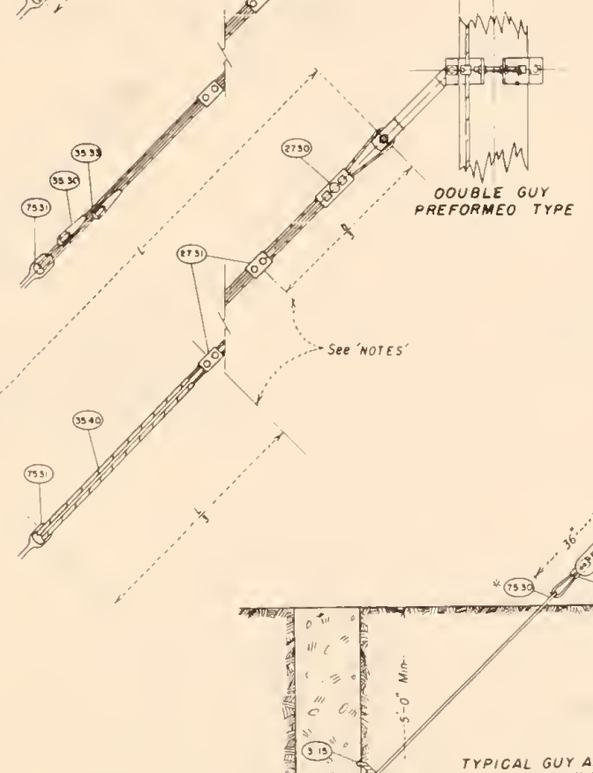

35 40
35 30
SINGLE GUY
PREFORMED TYPE
58 06 * or 58 11
WOOD GUY INSULATOR
ATTACHMENT
35 40
51 71 * OR 51 76
Net wood length
On type 3A and 3AB structures with single guys each side of pole, the guy strain insulator shall be provided with two sheave wheels
TWO SINGLE OR ONE DOUBLE GUY

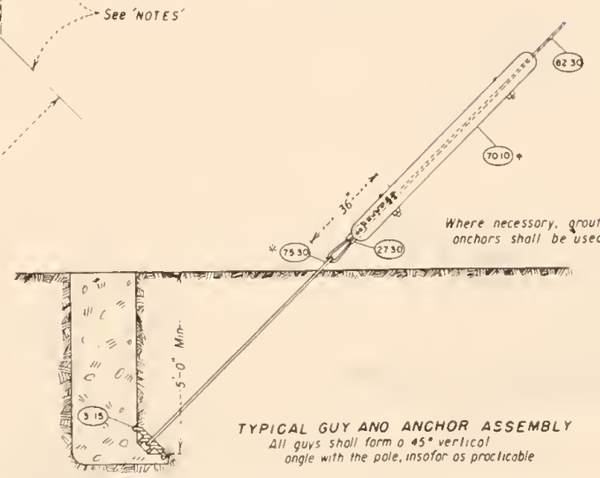
TYPICAL ANCHOR SPACING

For average soil conditions anchors shall be spaced so that each anchor has a minimum area of action as shown by the shaded area above. These areas should not overlap









TYPICAL GUY AND ANCHOR ASSEMBLY

All guys shall form a 45° vertical angle with the pole, insofar as practicable

LIST OF MATERIAL

PART NO.	DESCRIPTION	DWG NO 41
3 15	Anchor, Concrete	6049
9 20 **	Band, four-way strain, Type A	6030
27 30	Clamp, guy, 3 bolt, 6" long	6030
29 50	Clip, ground	
35 30	Deadend, automatic vise type for guy strand, with short bail	
35 33	Deadend, automatic vise type for guy strand, with extra long bail	
35 40	Deadend, preformed type for guy strand	
27 31	Clamp, guy, 2-bolt	
58 11	Link, connecting pair	6030
64 23	$\frac{3}{4}$-inch type MF locknut	
70 10 *	Guy protector	
75 30 *	Anchor rod, 1" x 8'-0", Thimbleye	
75 31 *	Anchor rod, 1" x 8'-0", Twineye	
77 27	Lag screw, $\frac{1}{2}$" x 4", felter drive	
82 30	Strand, galvanized, $\frac{7}{16}$-inch, high strength steel	
91 22	Washer, round flat, 1$\frac{3}{8}$" O.D. $\frac{9}{16}$" hole	
93 10	Wheel, sheave	6030
9 23 *	Band, four-way, strain, Type B	6031
58 06 *	Link, connecting, pair	6031
51 71 *△	Insulator, wood guy strain, with sheave wheel Minimum ultimate strength of 25,000 pounds	See table
51 76 *△	Insulator, fiberglass or epoxyglass guy strain, with sheave wheel. Minimum ultimate strength of 25,000 pounds	See table

NOTES

Install two bolt clamps on each double guy to prevent the two strands from slapping together under wind conditions
Clamps are to be installed after double guy has been tightened

* To be used when specified
*' Use 1" x 8' rod unless 1" x 10' rod is needed to obtain 5' foot depth
** Use two lag screws and washers for each four way strain band
For location of bands, see individual structure drawings
Additional details are shown on standard guy arrangement and assembly drawings
△ For guy each side of pole on type 3A and 3AB structures, see Dwg No. 41 6053
For two single guys, insulator shall be provided with two sheave wheels

WOOD GUY INSULATOR DATA

KV	NET WOOD LENGTH	ARCING DISTANCE	CLEARANCE AT TIP
138	10'-6"	3'-6"	1'-9"
161	12'-0"	4'-0"	2'-0"
230	13'-6"	5'-6"	2'-9"

FIBERGLASS OR EPOXYGLASS INSULATOR DATA

KV	MINIMUM NET LENGTH OF FIBERGLASS OR EPOXYGLASS	
138	6'-3"	NO ARCING HORNS
161	7'-0"	
230	8'-6"	

C	7-17-80 A2-MFS	CHANGED REFERENCE DRAWING NUMBER
B	1-16-80 A2-MFS	REVISED ANCHOR ROD SIZE TO 1" DIAMETER
A	8-6-79 A2-MFS	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

GUY ASSEMBLY AND DETAILS

DESIGNED FP — SUBMITTED
DRAWN WCM — RECOMMENDED
CHECKED CAC-RTO — APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 25, 1978 | E40-D-5674

AUGUST 6, 1979 | 41 | 6047

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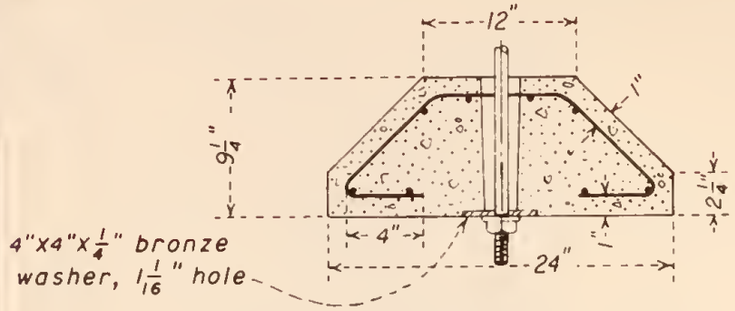
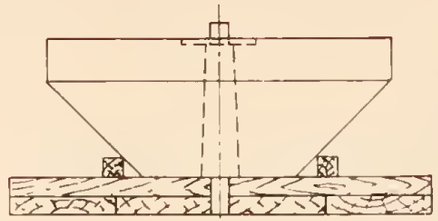


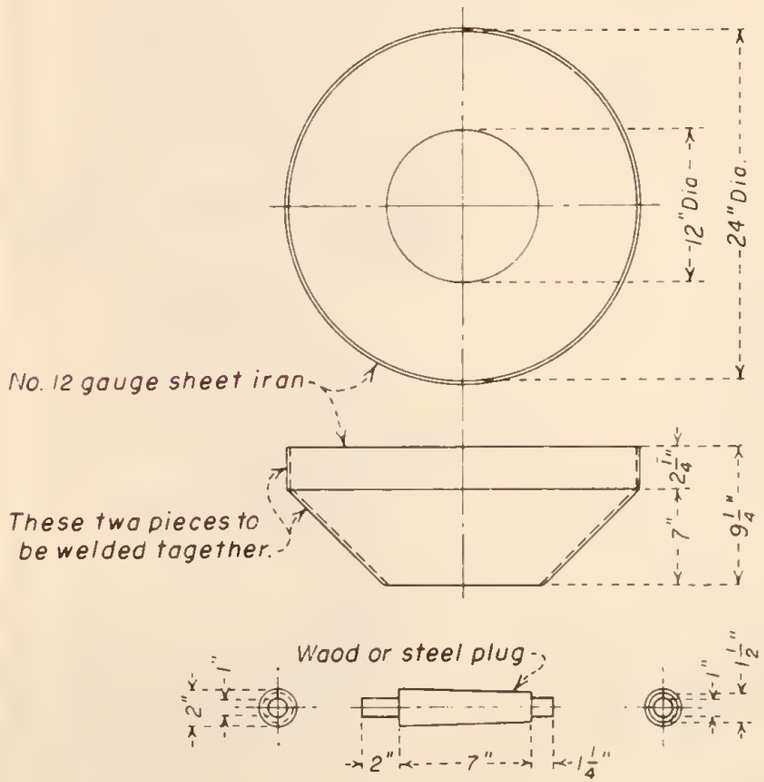
CONCRETE ANCHOR

Reinforce with 12 pieces of wire tied together with wire hoops as shown. 0.1483 Dia. cold drown steel wire ASTM Spec. A82.

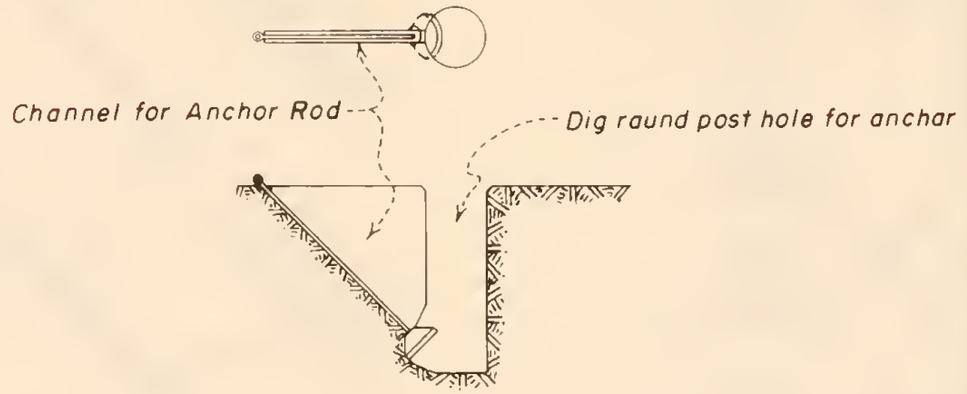


SET UP FOR POURING CONCRETE ANCHOR

Concrete shall be 1-2-4 mix using "peo" gravel.



DETAILS OF FORM FOR CONCRETE ANCHOR



DETAILS OF INSTALLATION OF CONCRETE ANCHOR

Earth to be well tamped when backfilled

B	1-16-80 A2-1475	REVISED ANCHOR DIMENSIONS
A	8-6-79 A2-1475	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY

WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

CONCRETE ANCHORS

DESIGNED H.A.M. SUBMITTED A.E. Lingren

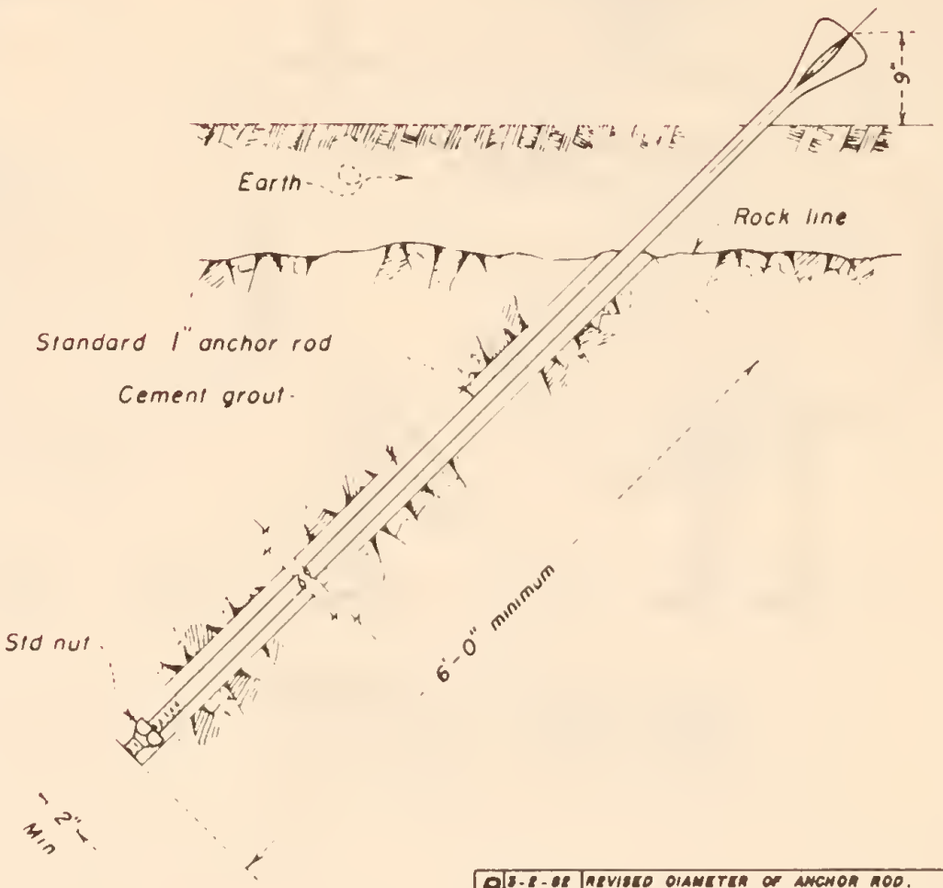
DRAWN T.J.K. - M.E.K. RECOMMENDED D.L. Turner

CHECKED H.R.L. APPROVED E.R. Cabral
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 16, 1978 | E40-D-3585

AUGUST 6, 1979 | 41 | 6049

ALWAYS THINK SAFETY



B	5-E-80 AE-RAE	REVISED DIAMETER OF ANCHOR ROD.
A	6-6-79 AE-RAE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

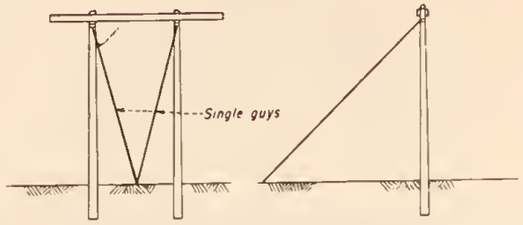
TRANSMISSION LINES

ANCHOR ROD GROUTING DETAILS

DESIGNED A.A.I. SUBMITTED
DRAWN A.P.R. RECOMMENDED
CHECKED A.J.E. - M.H.K. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

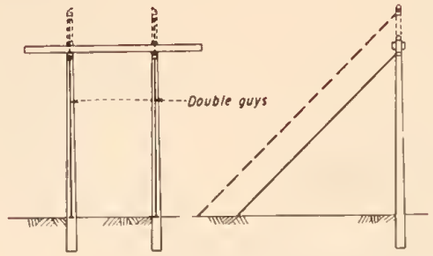
GOLDEN, COLORADO AUGUST 16, 1978		E40-D-3610
AUGUST 6, 1979	41	6050

32



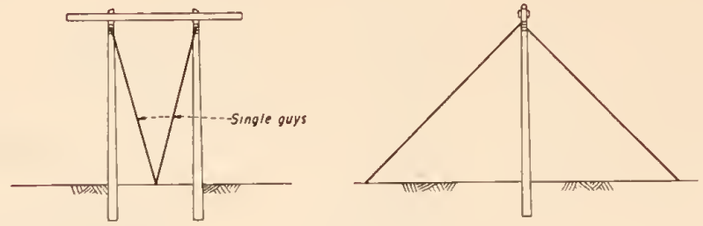
TWO LINE SINGLE GUYS, EITHER "FORWARD" OR "BACK"
2-LSG, F OR B

FIGURE No. 1



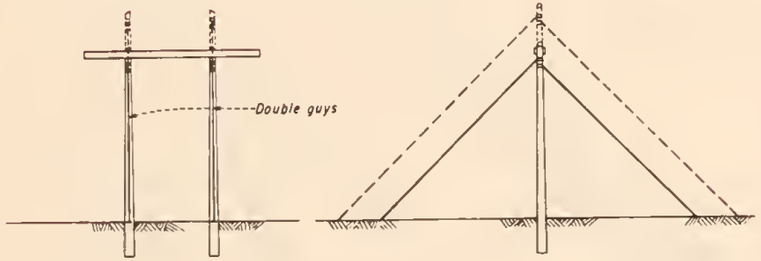
	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 2A	2-LDG, F or B		2
FIG 2B		2-LDG, F or B	2

FIGURE No. 2



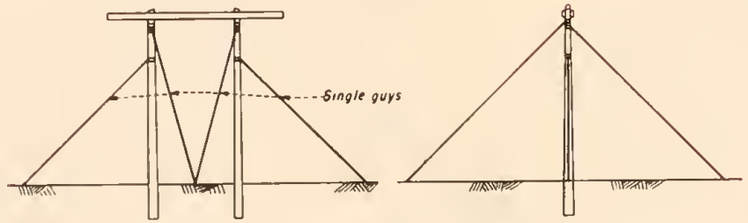
TWO LINE SINGLE GUYS EACH WAY
2-LSGEW

FIGURE No. 3



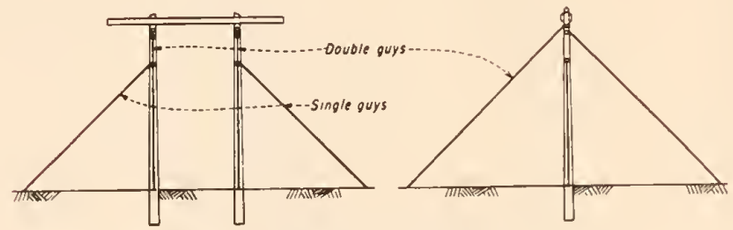
	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 4A	2-LDGEW		4
FIG 4B		2-LDGEW	4

FIGURE No. 4



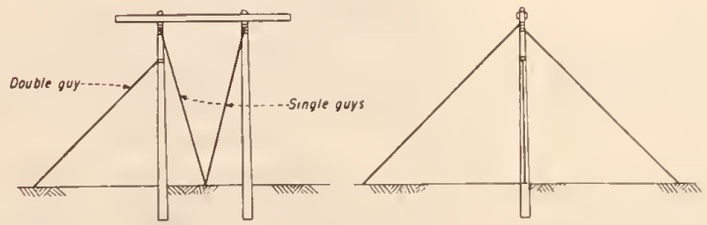
ONE SIDE SINGLE GUY EACH WAY AND TWO LINE SINGLE GUYS EACH WAY
1-SSGEW AND 2-LSGEW

FIGURE No. 5



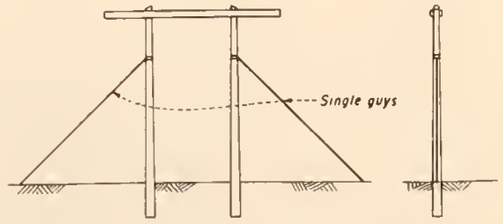
ONE SIDE SINGLE GUY EACH WAY AND TWO LINE DOUBLE GUYS EACH WAY
1-SSGEW AND 2-LDGEW

FIGURE No. 6



ONE SIDE DOUBLE GUY "RIGHT" OR "LEFT" AND TWO LINE SINGLE GUYS EACH WAY
1-SDG, R OR L AND 2-LSGEW

FIGURE No. 7



ONE SIDE SINGLE GUY EACH WAY
1-SSGEW

FIGURE No. 8

NOTES

"LDG. F or B" – Line double guy, forward or back
"LDGEW" – Line double guy each way.
"OGW" – Overhead ground wire

REFERENCE DRAWINGS

GUY ASSEMBLIES AND DETAILS.....41 6047

B	5-26-80	CHANGED REFERENCE DRAWING NUMBER AND MINOR TITLE BLOCK CHANGES
A	9-7-79	ADDED MAPS DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

TRANSMISSION LINE STANDARDS

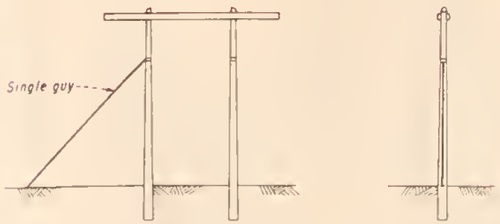
STANDARD GUY ARRANGEMENT

2-POLE TANGENT STRUCTURES

DESIGNED FP-AS SUBMITTED Albert A. Stevens
DRAWN TEB RECOMMENDED Gerald D. Brown
CHECKED PSC APPROVED E. O. Eshel
CHIEF, ELECTRICAL DESIGN BRANCH

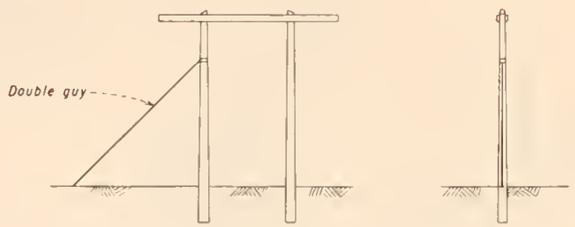
GOLDEN, COLORADO AUGUST 8, 1978 | E40-D-2757

AUGUST 6, 1979 | 41 | 6051



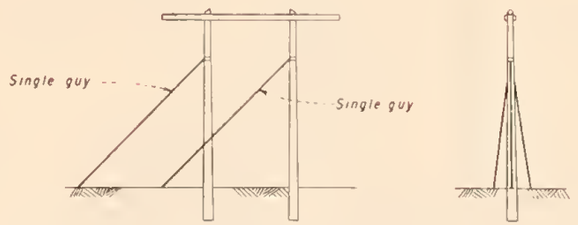
ONE ANGLE SINGLE GUY OR ONE SIDE SINGLE GUY RIGHT OR LEFT
1-ASG OR 1-SSG, R OR L

FIGURE No 1



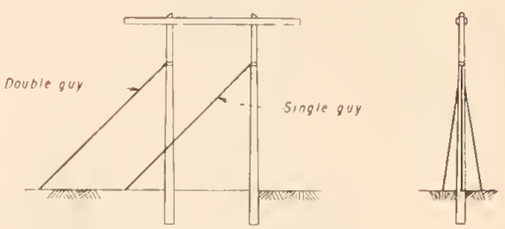
ONE ANGLE DOUBLE GUY
1-ADG

FIGURE No 2



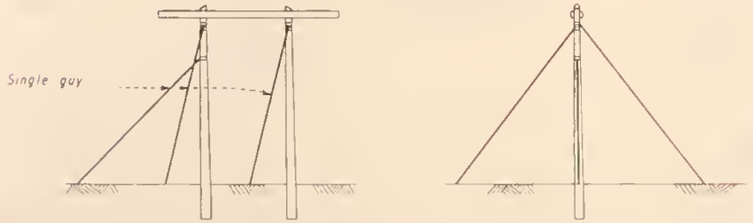
THREE ANGLE SINGLE GUYS
3-ASG

FIGURE No 3



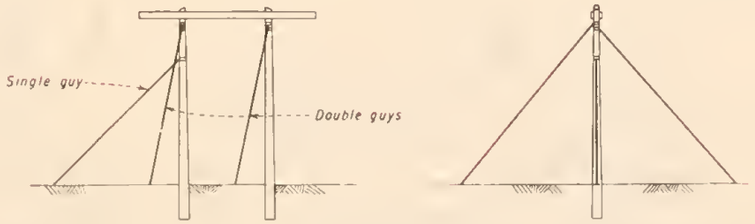
TWO ANGLE SINGLE GUYS AND ONE ANGLE DOUBLE GUY
2-ASG AND 1-ADG

FIGURE No 4



ONE ANGLE SINGLE GUY AND TWO LINE SINGLE GUYS EACH WAY
1-ASG AND 2-LSGEW

FIGURE No 5



ONE ANGLE SINGLE GUY AND TWO LINE DOUBLE GUYS EACH WAY
1-ASG AND 2-LDGEW

FIGURE No 6

REFERENCE DRAWINGS

GUY ASSEMBLIES AND DETAILS ... 41 6047

B	9-3-80 A2-MF	REVISED REFERENCE DRAWING NUMBER
A	8-6-79 A2-MF	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

STANDARD DESIGNS

TRANSMISSION LINES
STANDARD GUY ARRANGEMENT
2-POLE ANGLE STRUCTURES

DESIGNED FP-AS ... SUBMITTED Robert A. Ingram
DRAWN TEB ... RECOMMENDED Donald D Barney
CHECKED FP ... APPROVED E. R. Eshel
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 8, 1979	E40-D-2758	
AUGUST 6, 1979	41	6052

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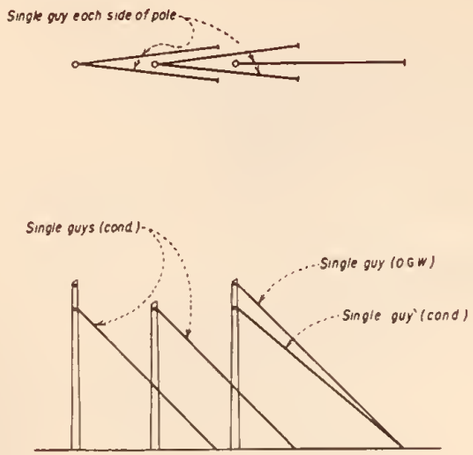
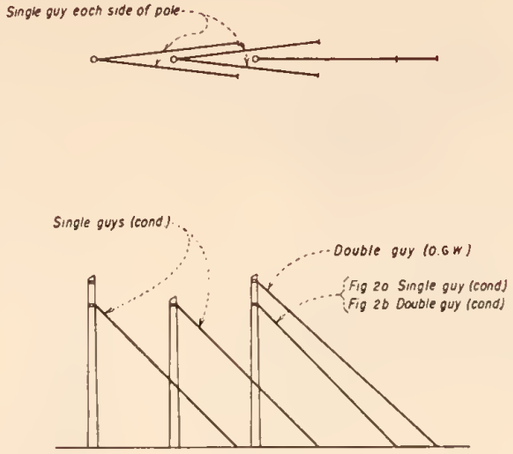


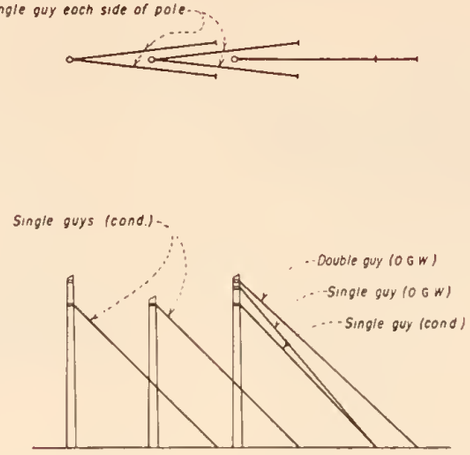
FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
5-ASG	1-ASG	5

FIGURE No. 1



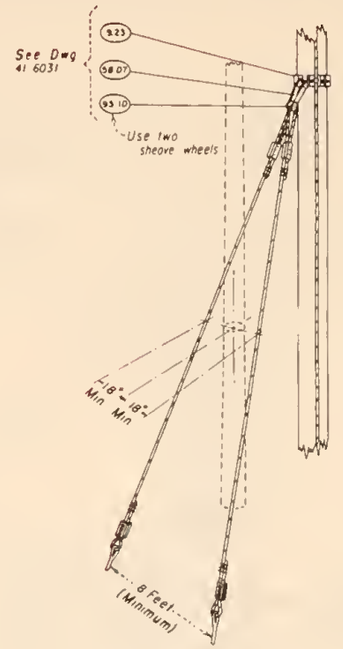
	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 2A	5-ASG	1-ADG	6
FIG 2B	4-ASG and 1-ADG	1-ADG	6

FIGURE No. 2

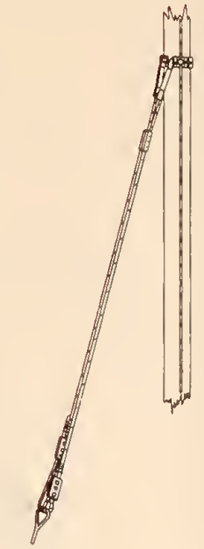


FOR CONDUCTOR	FOR OGW	NO OF ANCHORS
5-ASG	1-ADG and 1-ASG	6

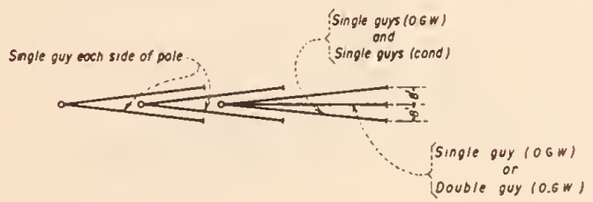
FIGURE No. 3

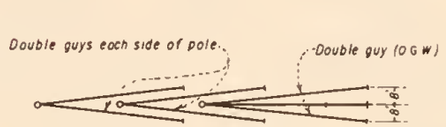


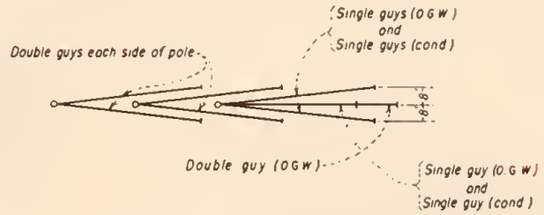
SINGLE GUY EACH SIDE OF POLE

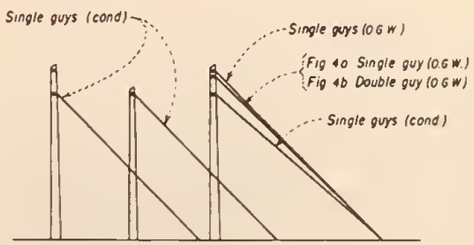


OODUBLE GUY



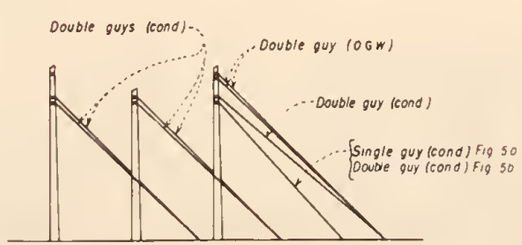






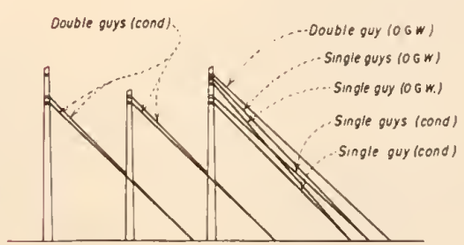
	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG. 4A	6-ASG	3-ASG	7
FIG 4B	6-ASG	2-ASG and 1-ADG	7

FIGURE No. 4



	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 5A	5-ADG and 1-ASG	2-ADG	8
FIG 5B	6-ADG	2-ADG	8

FIGURE No. 5



FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
4-ADG and 3-ASG	3-ASG and 1-ADG	8

FIGURE No. 6

"ASG"- Angle single guy
"ADG"- Angle double guy
"OGW"- Overhead ground wire

REFERENCE DRAWINGS

3A STRUCTURE 69 AND 115 KV	41 6000
3AB STRUCTURE 69 AND 115 KV	41 6001
3A STRUCTURE 138,161, AND 230 KV	41 6013
3AB STRUCTURE 138,161, AND 230 KV	41 6014
GUY ASSEMBLIES AND DETAILS	41 6047

C	6-18-80 AZ-	CHANGED REFERENCE DRAWING NUMBERS
B	1-18-80 AZ-	REVISED FIGURE NO 5
A	8-6-79 AZ-	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

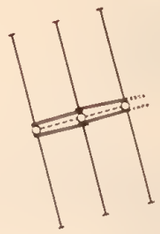
TRANSMISSION LINES

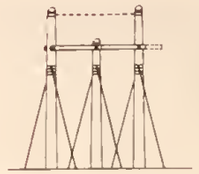
STANDARD GUY ARRANGEMENT FOR TYPE 3A AND 3AB STRUCTURES WITH OVERHEAD GROUND WIRES

DESIGNED J.M.W. SUBMITTED Robert L. Clayton
DRAWN C.D.M. RECOMMENDED Donald O. Young
CHECKED T.J.L. APPROVED L. E. Lobel
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 6, 1979 | E40-D-4241

AUGUST 6, 1979 | 41 | 6053





	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG. 1A	3-LSGEW	NONE	6
FIG 1B	3-LDGEW	NONE	6

FOR 3T AND 3Tx

FIGURE No 1

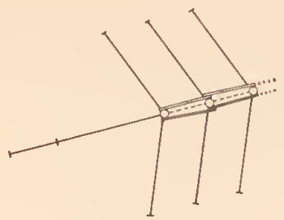


Fig 2A
Fig 2C
Fig 2E
Fig 2G
} Single Guy (for DGW)

Fig 2B
Fig 2D
Fig 2F
Fig 2H
} Double Guy (for OGW)

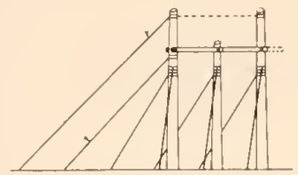


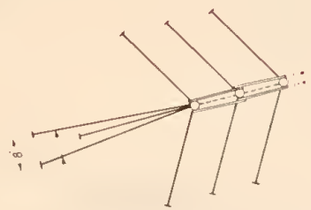
Fig 2A
Fig 2B
Fig 2E
Fig 2F
} Single Guy (for Cond)

Fig 2C
Fig 2D
Fig 2G
Fig 2H
} Double Guy (for Cond)

	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 2A	3-LSGEW and 1-ASG	1-ASG	8
FIG 2B	3-LSGEW and 1-ASG	1-ADG	8
FIG 2C	3-LSGEW and 1-ADG	1-ASG	8
FIG 2D	3-LSGEW and 1-ADG	1-ADG	8
FIG 2E	3-LDGEW and 1-ASG	1-ASG	8
FIG 2F	3-LDGEW and 1-ASG	1-ADG	8
FIG 2G	3-LDGEW and 1-ADG	1-ASG	8
FIG 2H	3-LDGEW and 1-ADG	1-ADG	8

FOR 3T AND 3Tx

FIGURE No 2



Double Guy (for OGW)

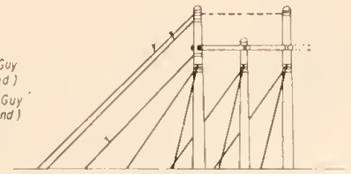


Fig 3A Single Guy (for Cond)

Fig 3B Double Guy (for Cond)

	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 3A	3-LSGEW and 1-ASG	2-ADG	9
FIG 3B	3-LSGEW and 1-ADG	2-ADG	9
FIG 3C	3-LDGEW and 1-ASG	2-ADG	9
FIG 3D	3-LDGEW and 1-ADG	2-ADG	9

FOR 3T AND 3Tx

FIGURE No 3

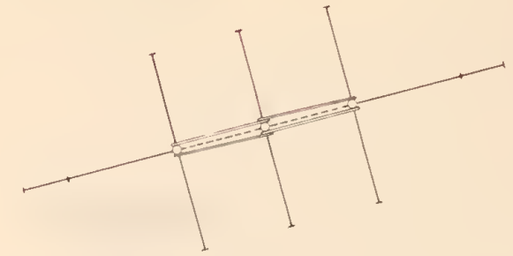
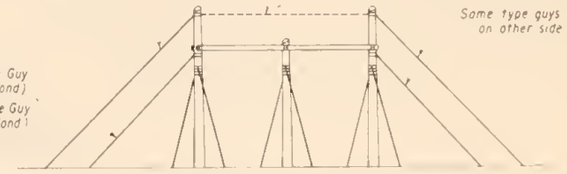


Fig 4A Single Guy
Fig 4C (for OGW)

Fig 4B Double Guy
Fig 4D (for OGW)

See structure drawing for details



Same type guys as on other side

Fig 4A Single Guy
Fig 4C (for Cond)

Fig 4B Double Guy
Fig 4D (for Cond)

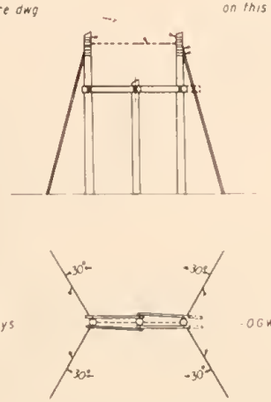
	FOR CONDUCTOR	FOR OGW	NO OF ANCHORS
FIG 4A	3-LSGEW and 1-SSGEW	1-SSGEW	10
FIG 4B	3-LSGEW and 1-SDGEW	1-SDGEW	10
FIG 4C	3-LDGEW and 1-SSGEW	1-SSGEW	10
FIG 4D	3-LDGEW and 1-SDGEW	1-SDGEW	10

FOR 3Tx ONLY

FIGURE No 4

Pole-to-pole tie, bonds, etc listed on structure dwg

These bonds listed on this dwg



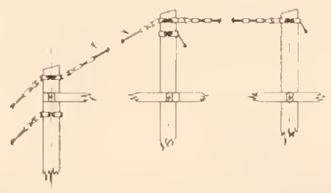
DGW Guys

OGW Guys

2-OFFSET DOUBLE GUYS EACH WAY FOR 3T AND 3Tx WITH DGW IN TENSION

FIGURE NO. 5

Pole-to-pole tie, bonds, etc. listed on structure drawing



	FOR CONDUCTOR	FOR OGW	NO. OF ANCHORS
FIG 6A	1-ADG	1-ADG	2
FIG 6B	1-ADG and 1-ASG	1-ADG	3

3AC AND 3AD STRUCTURES

FIGURE No 6

NOTES

"LSGEW" - Line single guy each way
"LDGEW" - Line double guy each way
"ASG" - Angle single guy
"ADG" - Angle double guy
"SSGEW" - Side single guy each way
"SDGEW" - Side double guy each way
"OGW" - Overhead ground wires

REFERENCE DRAWINGS

3T STRUCTURE 69 AND 115 KV	41 6075
3Tx STRUCTURE 69 AND 115 KV	41 6093
3AC STRUCTURE 69 AND 115 KV	41 6002
3AD STRUCTURE 138 AND 161 KV	41 6009
GUY ASSEMBLIES AND DETAILS	41 6047

B	9-3-80 AZ- [illegible]	REVISED DRAWING REFERENCE NUMBERS
A	8-6-79 AZ- 1685	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

STANDARD GUY ARRANGEMENT
FOR TYPE 3T, 3Tx, 3AC AND 3AD STRUCTURES
WITH OVERHEAD GROUND WIRES

DESIGNED- AS — SUBMITTED- Robert D. Glasscock
DRAWN- HEW — RECOMMENDED- Gerald D. Brown
CHECKED- JJL — APPROVED- Ed Sabal
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 6, 1979 | E40-D-4243

AUGUST 6, 1979 | 41 | 6054

36

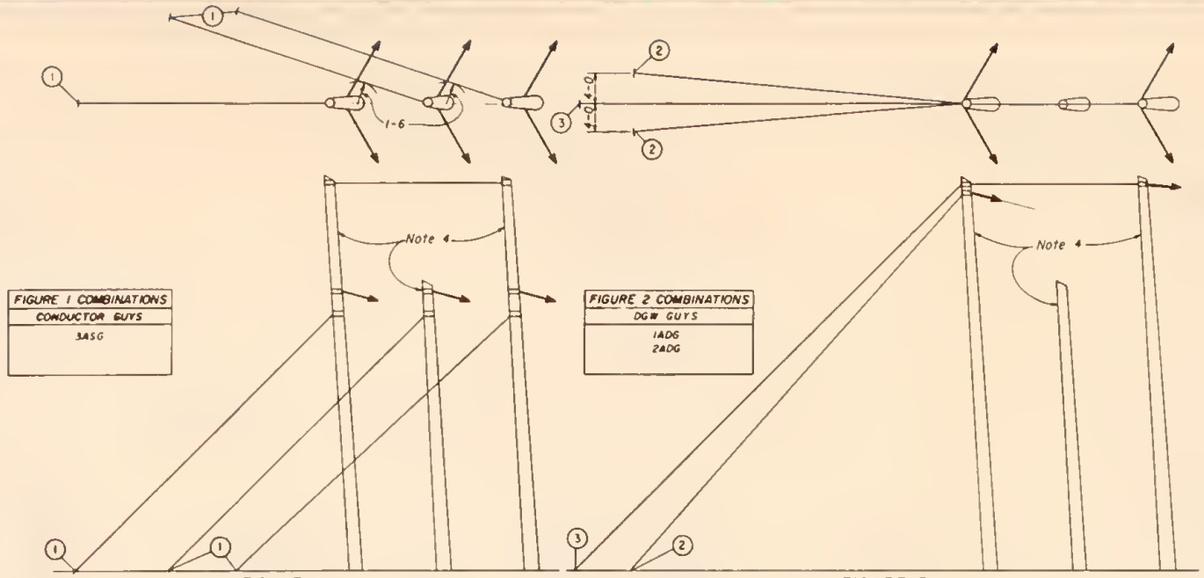

FIGURE 1
CONDUCTOR ANGLE GUYING (1°-60°)

FIGURE 2
ANGLE GUYING (10°-60°) WITH OGW IN TENSION
ANGLE GUYING (1°-60°) WITH OGW IN SUSPENSION
(See Note 3)

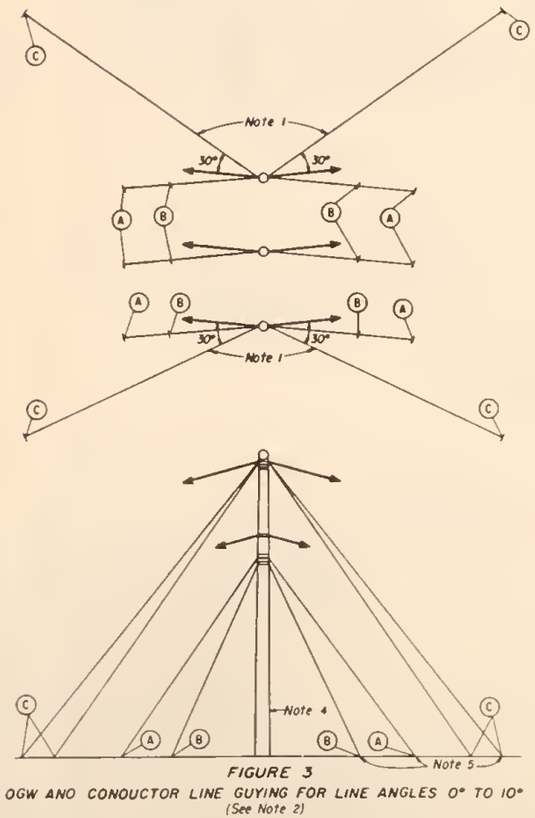

FIGURE 3
OGW AND CONDUCTOR LINE GUYING FOR LINE ANGLES 0° TO 10°
(See Note 2)

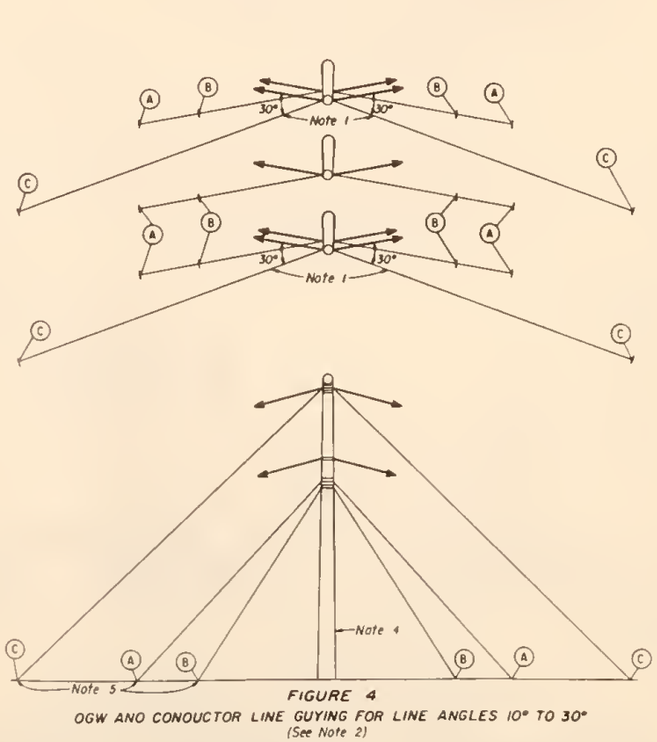

FIGURE 4
OGW AND CONDUCTOR LINE GUYING FOR LINE ANGLES 10° TO 30°
(See Note 2)

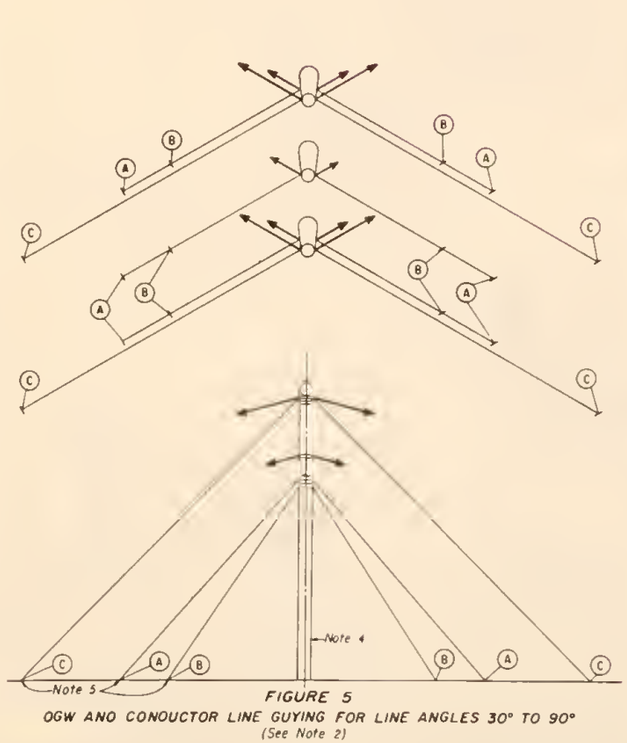

FIGURE 5
OGW AND CONDUCTOR LINE GUYING FOR LINE ANGLES 30° TO 90°
(See Note 2)

NOTES

OGW - Overhead ground wire
COND - Conductor
ASG - Angle single guy
ADG - Angle double guy
LSGEW - Line single guy each way
LDGEW - Line double guy each way
→ - OGW & conductor
○ Anchor identification reference

1 Offset OGW line guy 30° from conductor center line for 0° to 30° line angles
2 Omit OGW line guys for OGW in suspension (0° to 60°) OGW from 60° to 90° is always in tension Refer to drawing No 41 6018 for arrangement of bonds
3 Omit all angle guys for 0° to 1° and 60° to 90° line angles
4 Rake poles as required in table below Poles shall be given rake of ¼-inch for each foot of pole above ground Rake shall be against the strain
5 Refer to drawing No 41 6047 for anchor spacing

GUY AND ANCHOR REFERENCE CHART

LINE GUYING

CONDUCTOR GUYS	OGW GUYS	FIGURE	ANCHOR REF	NO. OF ANCHORS
3LSGEW	2LSGEW	3, 4, 5	Ⓐ Ⓒ	10
3LSGEW	2LDGEW	3, 4, 5	Ⓐ Ⓒ	10
3LDGEW	2LSGEW	3, 4, 5	Ⓐ Ⓒ	10
3LDGEW	2LDGEW	3, 4, 5	Ⓐ Ⓒ	10
3LSGEW-[illegible]	2LDGEW	3, 4, 5	Ⓐ Ⓑ Ⓒ	16
6LDGEW	2LDGEW	3, 4, 5	Ⓐ Ⓑ Ⓒ	16

ANGLE GUYING

CONDUCTOR GUYS	OGW GUYS	FIGURE	ANCHOR REF	NO. OF ANCHORS
3ASG	1ADG	1 & 2	① ③	4
3ASG	2ADG	1 & 2	① ②	5

POLE RAKE

OGW	LINE ANGLE	RAKE
SUSPENSION	0° TO 5°	NO
SUSPENSION	5° TO 60°	YES
TENSION	0° TO 10°	NO
TENSION	10° TO 90°	YES

REFERENCE DRAWINGS

3TA STRUCTURE 69, 115, 138, 161, & 230 KV ---------- 41 6018
GUY ASSEMBLIES AND DETAILS ---------- 41 6047

D	3-18-82 AZ-AAS	MINOR REVISIONS
C	7-14-80 AZ-AAS	REVISED REFERENCE DRAWING NUMBERS
B	1-16-80 AZ-AAS	MINOR REVISION
A	8-8-79 AZ-AAS	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

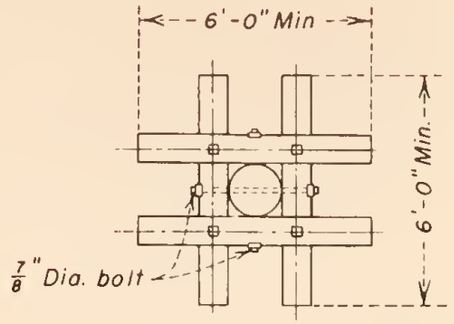
TRANSMISSION LINES

STANDARD GUY ARRANGEMENT FOR TYPE 3TA STRUCTURES

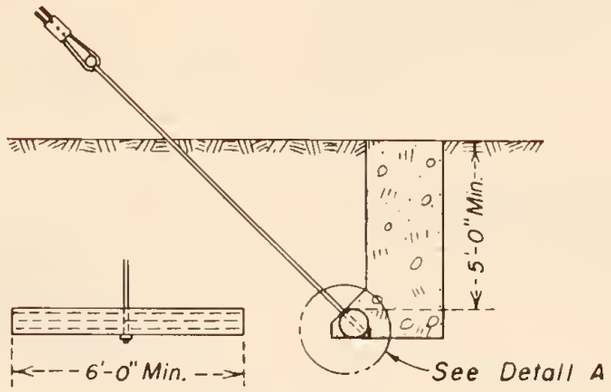
DESIGNED MJK ---------- SUBMITTED
DRAWN JW ---------- RECOMMENDED
CHECKED CAC ---------- APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 6, 1979 E40-D-6313

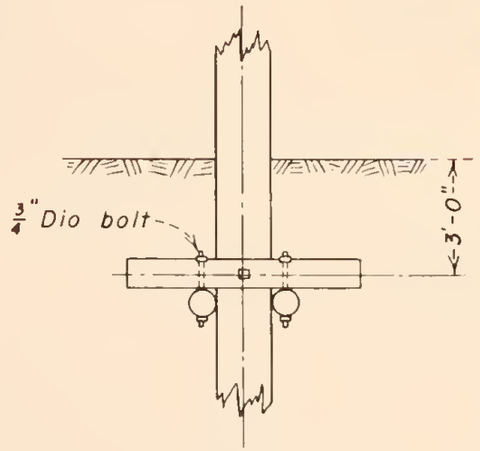
AUGUST 6, 1979 | 41 | 6055



TOP VIEW
OF BOG SHOE



BOG ANCHOR



BOG SHOE

NOTES

1. Bog shoes shall be Douglas fir or lodge-pole pine and shall have a minimum of 6 feet in length by 8 inches in diameter and shall have the same full-length pressure preservative treatment os that required for the poles.
2. Bog anchors shall be reinforced concrete with a minimum size of 6 feet in length by 8 inches in diameter.

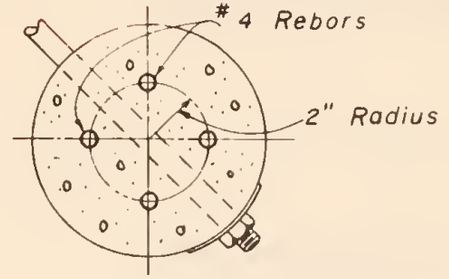
LIST OF MATERIALS

BOG SHOE

NO. REQ'D	OESCRIPTION
4	Bog shoe, wood, 8" x 6'-0"
2	7/8" x 42" Double arming bolt
12	4" x 4" x 1/4" square curved washer
4	3/4" x 24" Double orming bolt

BOG ANCHOR

NO. REQ'D	OESCRIPTION
1	Concrete onchor
1	Anchor rod, 3/4" x 8'-0"
1	Square curved, washer, 3" square cast iron, MIF PI43A or equal
4	#4 Reinforcing bars per Detail A



DETAIL A

A	7-17-80 A2-ME	REVISED TITLE BLOCK AND ADDED WAPA DRAWING NO

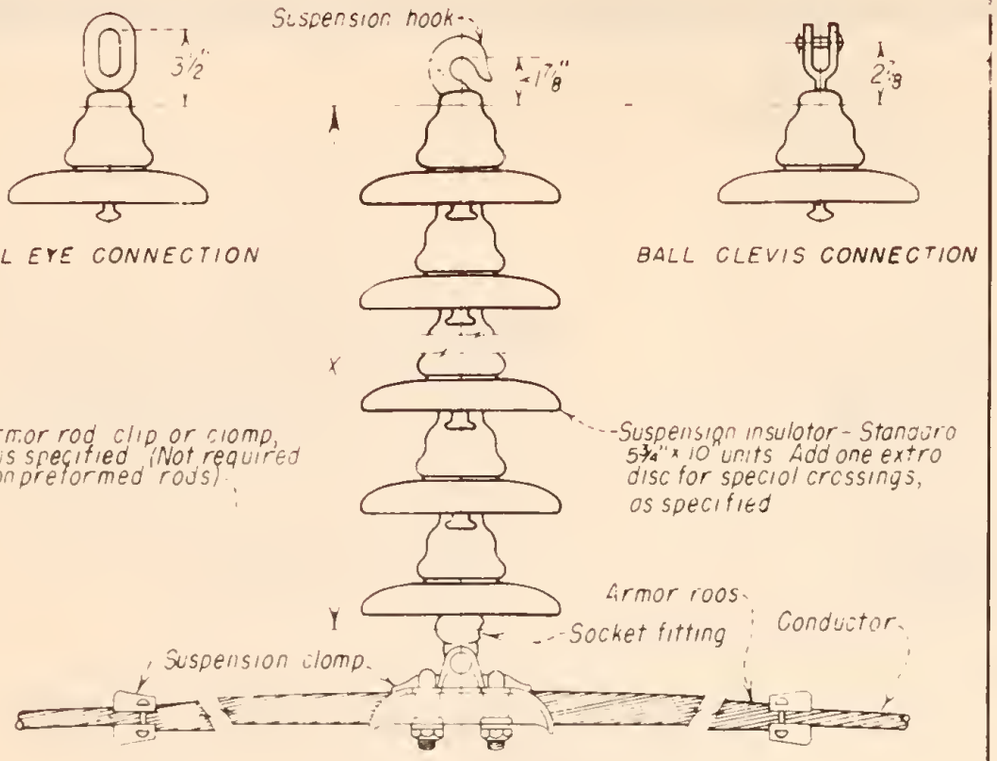
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

TRANSMISSION LINE STANDARDS
BOG SHOE AND BOG ANCHOR
OETAILS FOR WOOD POLE STRUCTURES

DRAWN F.E.P.-A.S. SUBMITTED J.V. Baptist
TRACED R.C.C. RECOMMENDED O.L. Rice
CHECKED C.A.C. APPROVED CHIEF ENGINEER

DENVER, COLO JULY 22, 1963 | 40-D-5920

JULY 17, 1980 | 41 | 9019



VOLTAGE K.V	TYPE OF STRUCTURE	DISCS PER STRING	X-DIMENSION INCHES
22-33	HS AND HA	2	11½
22-33	SA	3	17¼
44	HS AND HA	3	17¼
44	SA	4	23
69	HS, HSB, HA, HAB, HTR, 3T, 3TX, 4S, B SS	4	23
69	SA 3A, 3AB, B 3AC	6	34½
115	HS, HSB, HA, HAB, HTR, 3T, 3TX, 4S, BWS	7	40¼
115	SA, 3A, 3AB, B 3AC	9	51¾
138	HS, HSB, 3T, B 3TX	8	46
138	3A, 3AB, 3AC, B 3AD	10	57½
161	HS, HSB, HA, HAB, HTR, 3T B 3TX	10	57½
161	3A, 3AB, 3AC, B 3AD	11	63¼
230	HS, HSB, HS-22, 3S, 3T, B 3TR	12	69
230	3A, 3AB, 3AC, B 3AD	13	74¾

NOTES

When hold-down brackets and weights are necessary they will be specified on the structure list See Dwgs No. 41 1009 and 41 1010.

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UNITED STATES DEPARTMENT OF ENERGY

WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGN

TRANSMISSION LINES
WOOD POLE STRUCTURES
SUSPENSION INSULATOR ASSEMBLIES

DESIGNED EFP — SUBMITTED

DRAWN EJH — RECOMMENDED

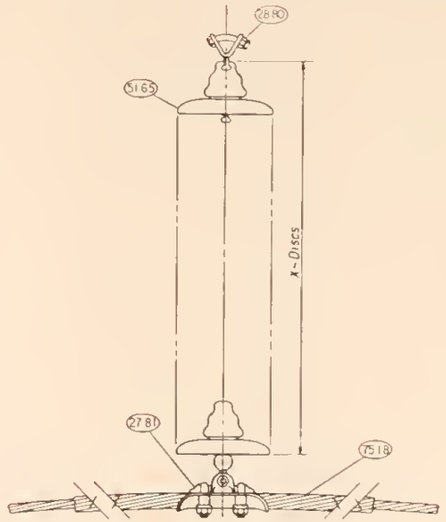
CHECKED EFP — APPROVED

CHIEF, ELECTRICAL DESIGN BRANCH

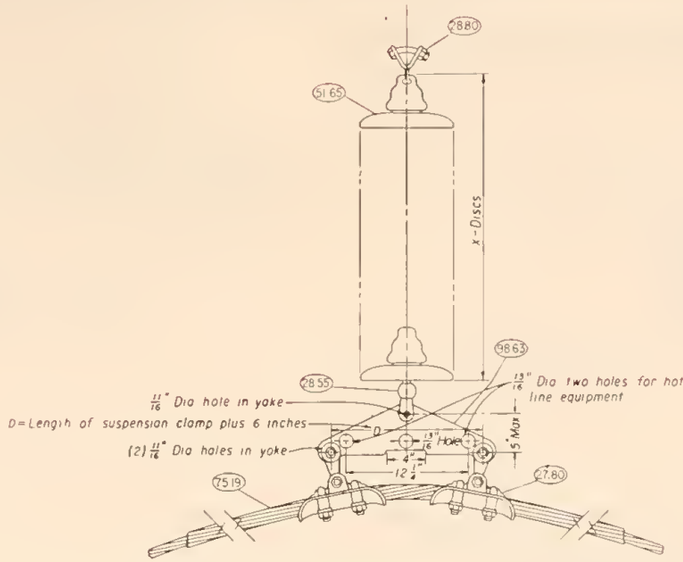
B	8-19-80 A2-AWE	CHANGED REFERENCE DWG NO
A	8-6-79 A2-WY	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

GOLDEN, COLORADO JUNE 19, 1978 — E40-D-2808

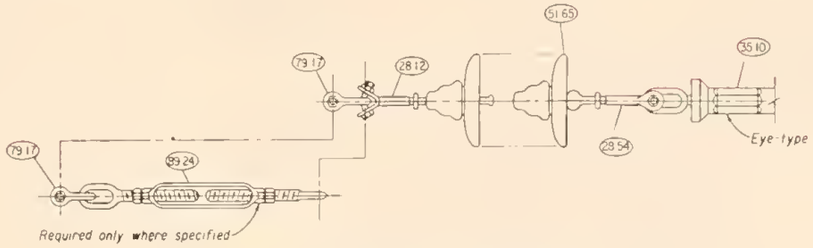
AUGUST 6, 1979 — 41 — 1000



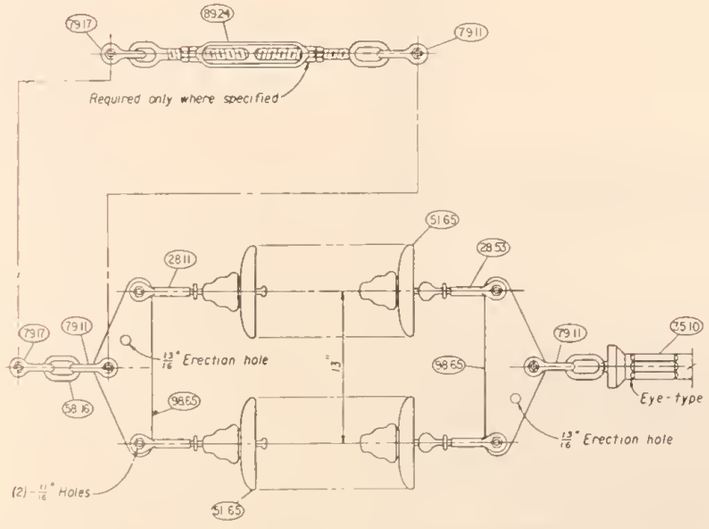
SINGLE STRING SUSPENSION ASSEMBLY
ULTIMATE STRENGTH 30,000 POUNDS



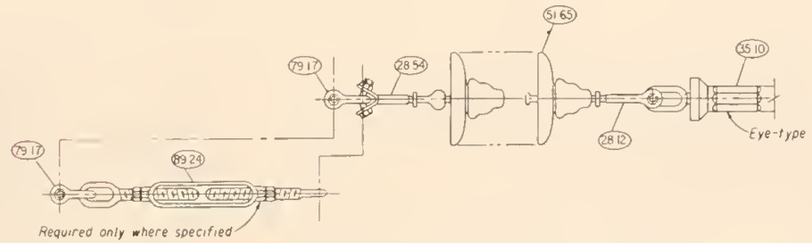
SINGLE SUSPENSION INSULATOR WITH YOKE
ULTIMATE STRENGTH 30,000 POUNDS



SINGLE TENSION INSULATOR ASSEMBLY WITH CAPS TOWARD STRUCTURE
ULTIMATE STRENGTH 30,000 POUNDS
(Use only when specified)



DOUBLE STRING TENSION ASSEMBLY FOR SINGLE CONDUCTOR
ULTIMATE STRENGTH 45,000 POUNDS



SINGLE TENSION INSULATOR ASSEMBLY WITH CAPS AWAY FROM STRUCTURE
ULTIMATE STRENGTH 30,000 POUNDS
(Use only when specified)

VOLTAGE K V	X-DISCS PER STRING	
	TENSION ASSEMBLY	SUSPENSION ASSEMBLY
34.5	5	4
69	7	6
115	10	9
138	11	10
161	12	11
230	15	14

LIST OF MATERIALS

*	ITEM NO	DESCRIPTION	REFERENCE
	27 80	Clamp, suspension, with clevis fitting, for conductor	
	27 81	Clamp, suspension, with socket fitting, for conductor	
	28 11	Clevis-ball, hot line type fitting, for conductor	BT-3094-1
	28 12	Y-Clevis-ball, hot line type	BT-3091
	28 53	Socket-clevis, hot line type	BT-3087
	28 54	Socket-Y-clevis, hot line type	BT-3096
	28 80	Clevis, Y-ball	41 1005
	35 10	Compression deadend, eye fitting (chain type)	
	51 65	Insulator, suspension type, 10" diameter, 5 3/4" spacing	
	58 16	Chain link	41 1005
*	75 18	Rods, armor, preformed, single support	
*	75 19	Rods, armor, preformed, double support	
	79 17	V-Shackle, Lindsey Cat NO 3203 or equal	
	89 24	Turnbuckle, eye-eye, 12" takeup, with jam nuts	BT-3177
△	98 63	Yoke, 3/8" thick	
△	98 65	Yoke, 3/8" thick	BT-851IHT
	79 11	Shackle, anchor type	BT-3025
	28 55	Socket-clevis	BT-3040

NOTES

1. All ferrous hardware shall be heat treated, except that yoke plates may be heat treated at the contractors option
2. All ferrous material shall be galvanized after drilling and forging in accordance with A S T M Designation A-153
3. Strength of hardware components in a sub-assembly shall be equal to or greater than the strength of the insulator units in that sub-assembly The over-all strength of the complete insulator assemblies shall be as indicated

LEGEND

△ Yokes shall have full radius edges and corners
* All hardware fittings to be furnished with hexbolt, hexnut and key
≠ Used only when specified

C	9-3-80 A2-AK	REVISED REFERENCE NUMBERS
B	1-16-80 A2-	REVISED V-SHACKLE REFERENCE
A	8-6-79 A2	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

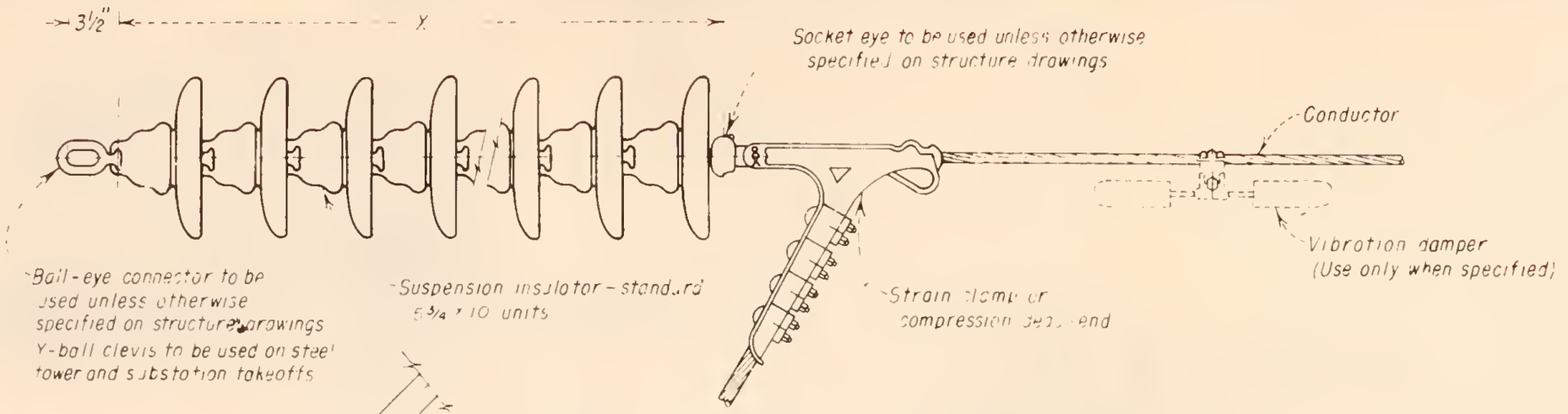
STANDARD DESIGN

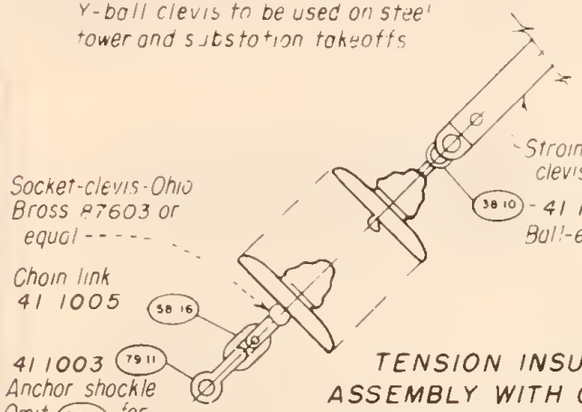
TRANSMISSION LINES
INSULATOR ASSEMBLY DETAILS
FOR STEEL TOWERS

DESIGNED FEP-AOS SUBMITTED
DRAWN WLB RECOMMENDED
CHECKED FP APPROVED
CHIEF ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO JUNE 19, 1978 | E40-D-4683

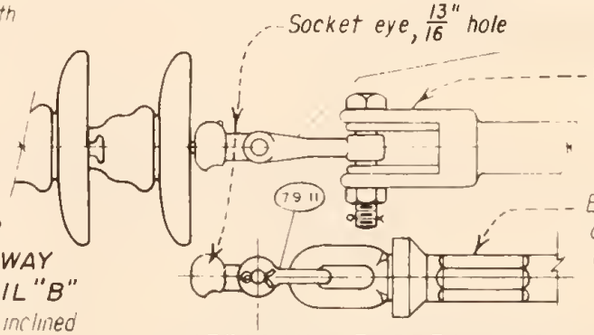
AUGUST 6, 1979 | 41 | 1001


3½"
X
Socket eye to be used unless otherwise specified on structure drawings
Conductor
Vibration damper (Use only when specified)
Ball-eye connector to be used unless otherwise specified on structure drawings
Y-ball clevis to be used on steel tower and substation takeoffs
Suspension insulator - standard 5¾ x 10 units
Strain clamp or compression dead-end



TENSION INSULATOR ASSEMBLY WITH CAPS AWAY FROM STRUCTURE-DETAIL "B"
(To be used at the lower support of inclined spans when specified)

TENSION INSULATOR ASSEMBLY-DETAIL "A"



ATTACHMENT DETAIL FOR COMPRESSION DEAD END FITTING

38 19 or 38 20 or 38 21 or 38 22

90° Clevis-Eye (See Dwg 41 1003) Required only when compression dead-end clevis bolt is too large for socket-eye fitting

OR

38 52 or 38 53 or 38 54 or 38 55

Special socket-eye (See Dwg 41 1003) may be used in lieu of socket-eye and clevis-eye combination above

WOOD POLE STRUCTURES

VOLTAGE K.V.	TYPE OF STRUCTURE	DISCS PER STRING	X-DIMENSION INCHES
22-33	HT, ST, SAT, SBT, & HSWT, 3TA	3	17¼
44	HT, ST, SAT, SBT, & HSWT, 3TA	4	23
69	ST, 3TA	5	28¾
	SAT, 3AT, 3DE, 3T, 3TX, 3BT/4BT, HSWT	6	34½
115	WT, 3TA	6	46
	SAT, 3AT, 3DE, 3T, 3TX, 3BT/4BT, 4SWT	9	51¾
138	3AT, 3T, 3TX, 3TA	10	57½
161	3AT, 3DE, 3T, 3TX, 4BT, & 4SWT, 3TA	11	63¼
230	3AT, 3T, 3DE, & 3TR, 3TA	13	74¾

STEEL TOWER AND SUBSTATION TAKEOFFS

VOLTAGE K.V.	TYPE OF STRUCTURE	DISCS PER STRING	X-DIMENSION INCHES
34.5	DEAD ENDS ON STEEL TOWERS OR SUBSTATIONS	5	28¾
69		7	40¼
115		10	57½
138		11	63¼
161		12	69
230		15	86¼

B	9-3-80 A2-MFE	REVISED REFERENCE NUMBERS.
A	8-6-79 A2-MFE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK.

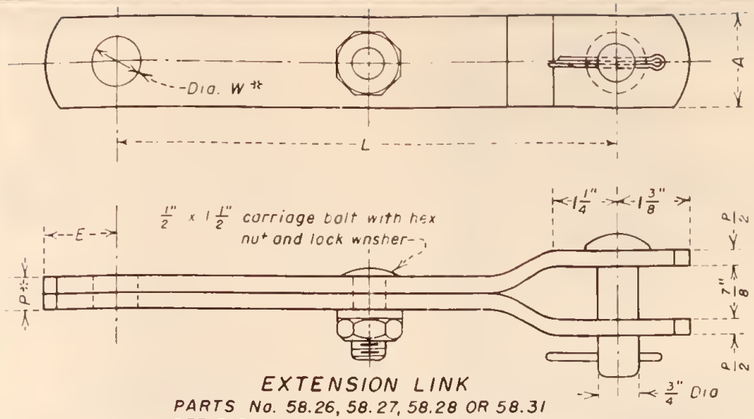
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS
TRANSMISSION LINES
WOOD POLE STRUCTURES
TENSION INSULATOR ASSEMBLIES

DESIGNED E.F.P. SUBMITTED
DRAWN E.J.H. RECOMMENDED
CHECKED F.S.C. APPROVED
CHIEF ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO DECEMBER 4, 1978 | E40-D-2809

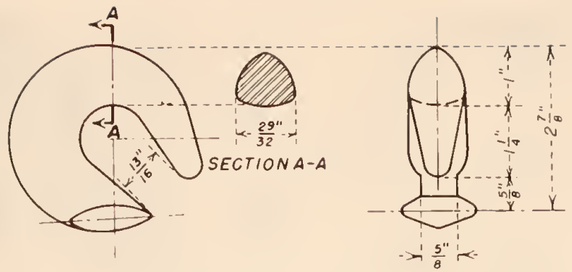
AUGUST 6, 1979 | 41 | 1002



EXTENSION LINK

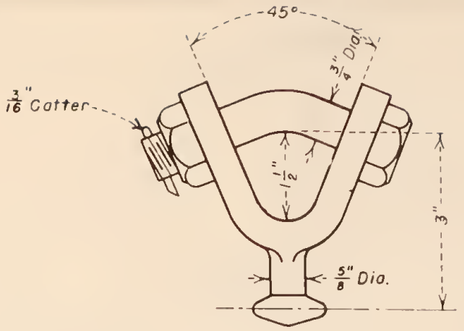
PARTS No. 58.26, 58.27, 58.28 OR 58.31
(SEE TABLE BELOW FOR DIMENSIONS)

TYPE DEAD END	CONDUCTOR	STRANDING	P *	W * DIAMETER	A MIN WIDTH	E * MAX.	EXTENSION LINKS, LENGTH "L" FOR THE FOLLOWING DEFLECTION ANGLES 40°-52°	52°-60°	60°-70°	70°-90°	PART NO.	"L"	ULTIMATE STRENGTH
STRAIN CLAMP OR COMPRESSION DEAD END	4/0	6/1	1/2"	11/16"	1 3/4"	1"	34"	24"	14"	11"	58.26a	11"	18,000 **
	266,800	26/7	1/2"	11/16"	1 3/4"	1"	34"	24"	14"	11"	58.26b	14"	
	300,000	26/7	1/2"	11/16"	1 3/4"	1"	34"	24"	14"	11"	58.26c	24"	
											58.26d	34"	
	336,400	26/7	3/4"	13/16"	2"	1 1/2"	34"	24"	14"	11"	58.27a	11"	25,000
	397,500	26/7	3/4"	13/16"	2"	1 1/2"	34"	24"	14"	11"	58.27b	14"	
											58.27c	24"	
											58.27d	34"	
	477,000 TO 636,000	24/7 & 26/7	1"	1 1/16"	2"	1 1/2"	34"	24"	14"	11"	58.28a	11"	30,000
											58.28b	14"	
											58.28c	24"	
											58.28d	34"	
COMP DEAD END	795,000	45/7	1"	1 1/16"	2"	1 1/2"	34"	24"	14"	11"			
	795,000	26/7	1 1/4"	1 3/16"	2"	1 1/2"	34"	24"	14"	11"	58.31a	11"	30,000
	954 OCTO TO 1,192,500	ALL	1 1/4"	1 3/16"	2"	1 1/2"	34"	24"	14"	11"	58.31b	14"	
											58.31c	24"	
											58.31d	34"	



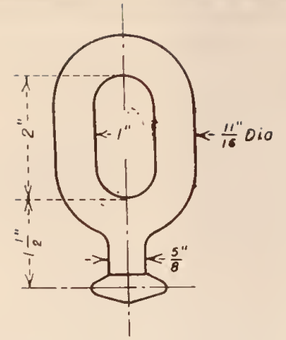
SUSPENSION HOOK

(Locking Type)
PART No. 48.10
ULTIMATE STRENGTH 25,000 LBS.



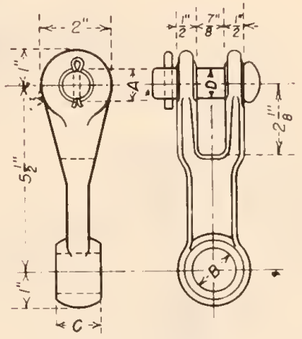
"Y"-BALL CLEVIS

PART No. 28.80
ULTIMATE STRENGTH 25,000 LBS.



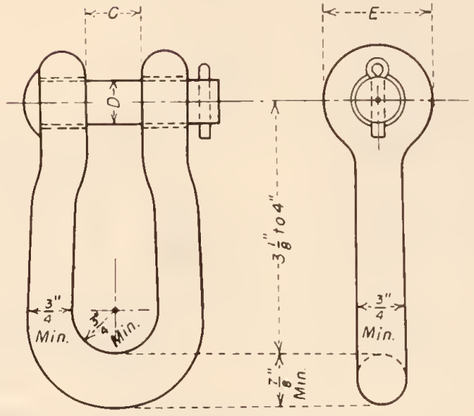
BALL EYE CONNECTOR

PART No. 38.10
ULTIMATE STRENGTH 25,000 LBS.



CLEVIS-EYE

SEE TABLE OF DIMENSIONS
PART NO. 38.19, 38.20, 38.21, 38.22, 38.23, 38.24
ULTIMATE STRENGTH 30,000 LBS.



ANCHOR SHACKLE

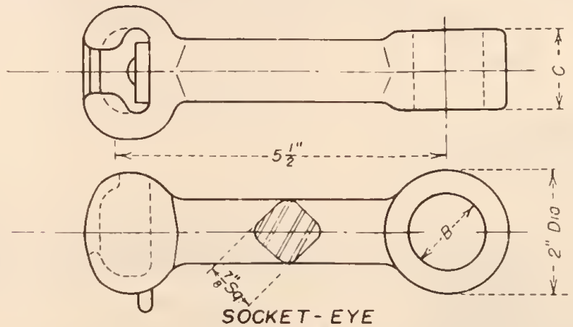
PART NO 79.11 AND 79.15
ULTIMATE STRENGTH 30,000 LBS.

NOTES

Fittings are to be forged steel (except extension link). All material shall be galvanized after drilling and forging in accordance with A.S.T.M. Designation A153.

* Dimensions "P", "W", "B," and "C" are based on Aluminum Co. of America compression dead-ends. For use with strain clamps, dimensions "W" and "B" shall be 1/16-inch more than the pin size of clevis fitting. Dimension "C" and "E" shall be adequate to insure proper fit in clevis fitting.

** Ultimate strength of Items No. 58.26a, 58.26b, 58.26c, and 58.26d to be 25,000 lbs. when used with double yoke tension insulator assemblies.



SOCKET-EYE

SEE TABLE OF DIMENSIONS
PART NO. 38.52, 38.53, 38.54, 38.55
ULTIMATE STRENGTH 30,000 LBS.

TABLE OF DIMENSIONS FOR CLEVIS-EYE AND SOCKET-EYE

CONDUCTOR SIZE	STRANDING	TYPE DEADEND	PART NO.	A	B *	C *	D
266.8, 300 0	26/7	COMPRESSION	38.19, 38.52	13/16"	11/16"	11/16"	3/4"
336.4, 397.5	26/7	COMPRESSION	38.20, 38.53	13/16"	13/16"	3/4" to 13/16"	3/4"
477 0 TO 636.0	24/7 & 26/7	COMPRESSION	38.21, 38.54	13/16"	1 1/16"	1" to 1 1/16"	3/4"
795 0	45/7						
795 0	26/7	COMPRESSION	38.22, 38.55	13/16"	1 3/16"	1 1/4"	3/4"
954 0 TO [illegible]	ALL						
SPECIAL			38.23	15/16"	1 3/16"	1 1/4"	7/8"
ALL		STRAIN CLAMP	38.24	13/16	*	*	3/4

TABLE OF DIMENSIONS FOR ANCHOR SHACKLE

PART NO	C	D	E
79.11	7/8"	3/4"	1 3/4"
79.15	1 3/8"	1"	2 1/8"

A	8-6-79	ADDED WAPA DRAWING NUMBER AND AE-M REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

TRANSMISSION LINES

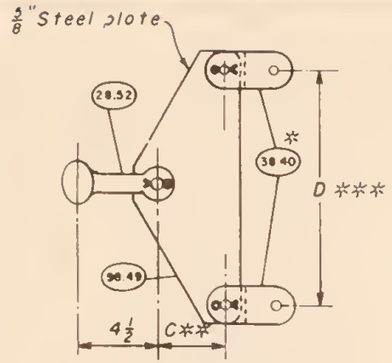
INSULATOR HARDWARE DETAILS

DESIGNED F.E.P. SUBMITTED
DRAWN E.V.M. RECOMMENDED
CHECKED A.J.E. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

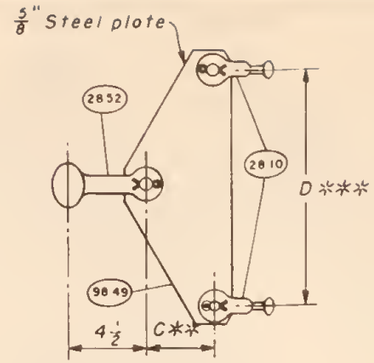
GOLDEN, COLORADO AUGUST 16, 1978 | E40-D-3182

AUGUST 6, 1979 | 41 | 1003

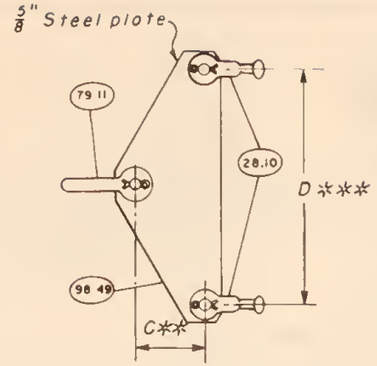
42



PART NO. 98.53
FOR TYPE 3A AND 3AB STR'S
SINGLE STRING - FOR ANGLE
20° TO 60°



PART NO. 98.54
FOR TYPE 3AB STRUCTURE
DOUBLE STRING

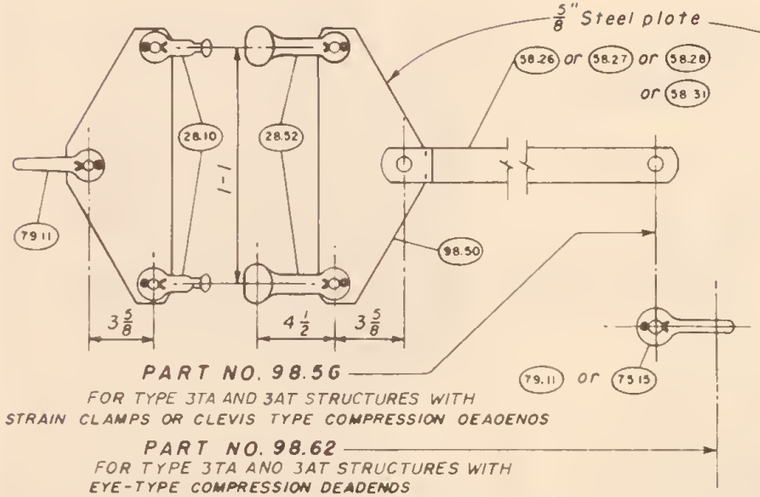


PART NO. 98.55
FOR TYPE 3A STRUCTURE
DOUBLE STRING

SINGLE YOKE ASSEMBLIES

LIST OF MATERIAL

PART NO.	ASSEMBLY PART NO. 98.53	98.54	98.55	98.56	98.57	98.58	98.59	98.61	98.62	DESCRIPTION	DWG. NO. 41
79.11 or 79.15									1	Use 79.11 with 58.28 Use 79.15 with 58.31	1003
28.10		2	2	2	2	3	2	2	2	Clevis, boll	
28.52	1	1		2	2	2	2	2	2	Clevis, socket, 4½" long	
38.40	2									Eye, clevis *	
58.26 .27 28 or .31				1					1	Link, extension	1003
79.11			1	1	2	1	1	2	1	Shackle, anchor	1003
98.49	1	1	1							Yoke plate	
98.50				2	2	2	2	2	2	Yoke plate, strain	
38.19 or 38.20 or 38.21 or 38.22 or 38.24					1		1			Eye, clevis, 5½" long, 90°	1003



PART NO. 98.56
FOR TYPE 3TA AND 3AT STRUCTURES WITH
STRAIN CLAMPS OR CLEVIS TYPE COMPRESSION DEADENDS

PART NO. 98.62
FOR TYPE 3TA AND 3AT STRUCTURES WITH
EYE-TYPE COMPRESSION DEADENDS

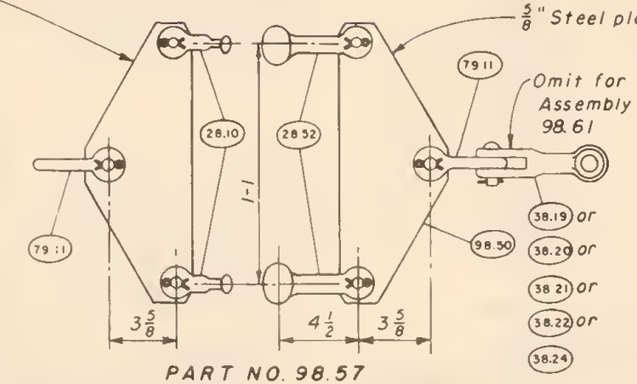
Note: All material shall be galvanized after drilling and forging in accordance with A.S.T.M. Designation A153.

Ultimate strength of completed assemblies shall be not less than 25,000 lbs. for 397,500 CM ACSR, and smaller, and 30,000 lbs for ACSR larger than 397,500 CM

* Thickness of eye end of Part No. 38.40 shall be adequate to insure proper fit in conductor suspension clamp

** Width as required to obtain specified strength.

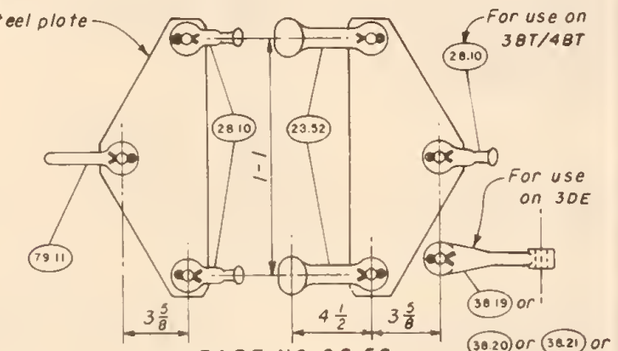
*** Length of suspension clamp plus 10 inches.



PART NO. 98.57
FOR TYPE 3TA, 3T AND 3TX STRUCTURES (AS SHOWN)
FOR TYPE 4SWT STRUCTURE (HARDWARE ARRANGEMENT PER DWG. NO. 41 6005)

PART NO. 98.61
(Same as part No. 98.57, except omit 90° clevis-eye)
FOR USE WITH EYE TYPE COMPRESSION DEAD ENDS ONLY, IN LIEU OF PART NO.'S 98.57, 98.58 AND 98.59

DOUBLE YOKE ASSEMBLIES



PART NO. 98.58
FOR TYPE 3BT/4BT STRUCTURE

PART NO. 98.59
FOR TYPE 3DE STRUCTURE

B	6-17-80 AZ-[illegible]	CHANGED REFERENCE DRAWING NUMBERS	
A	9-6-79 AZ-[illegible]	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK	

ALWAYS THINK SAFETY

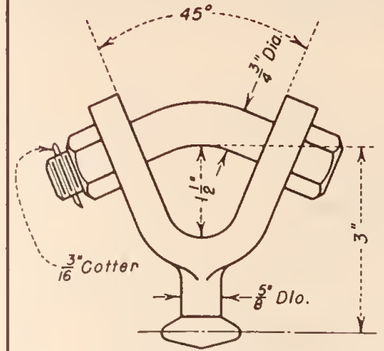
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS
TRANSMISSION LINES
STRAIN YOKES AND YOKE ASSEMBLIES

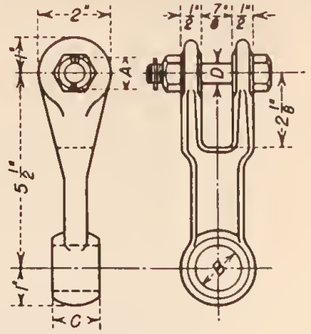
DESIGNED FFR — SUBMITTED [signature]
DRAWN SCS — RECOMMENDED [signature]
CHECKED KJD-WHC — APPROVED [signature]
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1978 — E40-D-5280

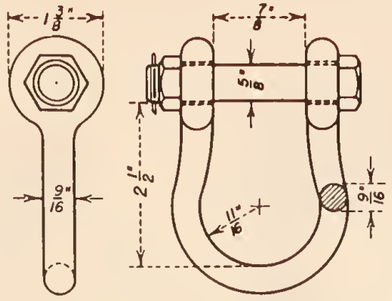
AUGUST 6, 1979 | 41 | 1004



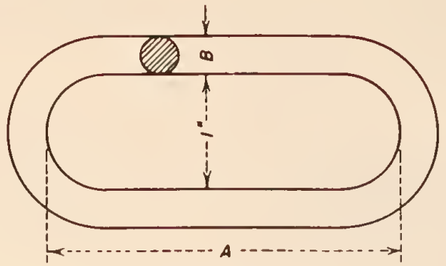
"Y" – BALL CLEVIS
PART NO. 28.80
ULTIMATE STRENGTH 25,000 LBS.



CLEVIS – EYE
SEE TABLE OF DIMENSIONS
PART NO. 38.19, 38.20, 38.21, 38.22, 38.24
ULTIMATE STRENGTH 33,000 LBS.



ANCHOR SHACKLE
PART NO. 79.13
ULTIMATE STRENGTH 25,000 LBS.



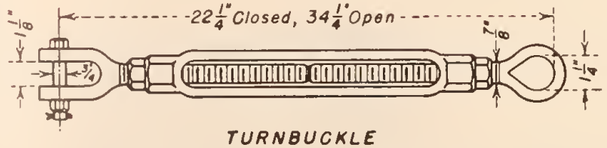
CHAIN LINK
PART NO. 58.15, 58.16

PART NO.	A (MIN.)	B (MIN.)	ULT. STRENGTH
58.15	2 1/4"	1/2"	25,000 LBS.
58.16	2 7/8"	5/8"	33,000 LBS.

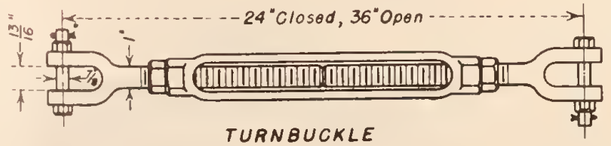
PART NO.	DESCRIPTION
♦ 28.11	Clevis, Boll, Hot line type
♦ 28.53	Clevis, Socket, Hot line type
28.80	Clevis, Y-Boll
38.19	Eye, Clevis, 5 1/2" long, 90°, see toble below
38.20	Eye, Clevis, 5 1/2" long, 90°, see table below
38.21	Eye, Clevis, 5 1/2" long, 90°, see toble below
38.22	Eye, Clevis, 5 1/2" long, 90°, see toble below
38.24	Eye, Clevis, 5 1/2" long, 90°, see toble below
68.13 58.16	Link, Chain
79.11 79.13	Shackle, Anchor type
79.17	V-Shackle, Lindsey Cal. No. 3203 or Equal.
✲ 89.20	Turnbuckle, Clevis – Eye, 7/8, 12" Take - Up
✲ 89.25	Turnbuckle, Clevis – Clevis, 1", 12" Take - Up
✲ 98.51	Yoke, Strain, Double assembly, with turnbuckle
98.52	Yoke, Strain, Double assembly, without turnbuckle
38.10	Eye, Ball
38.52 38.53 38.54 38.55	Eye, Socket, 5 1/2" long, see table below
♦ 98.60	Yoke, Strain, Double assembly, with turnbuckle
♦ 98.61	Yoke, Strain, Double assembly, without turnbuckle

TABLE OF DIMENSIONS FOR CLEVIS-EYE AND SOCKET-EYE

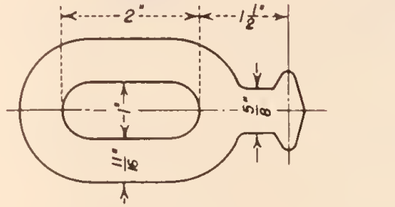
PART NO.	A	B	C	D
38.19, 38.52	13/16"	11/16"	11/16"	3/4"
38.20, 38.53	13/16"	13/16"	3/4" to 13/16"	3/4"
38.21, 38.54	13/16"	1 1/16"	3/4" to 1 1/16"	3/4"
38.22, 38.55	13/16"	1 3/16"	1 1/4"	3/4"
38.24	13/16"	✲ ✲	✲ ✲	3/4"



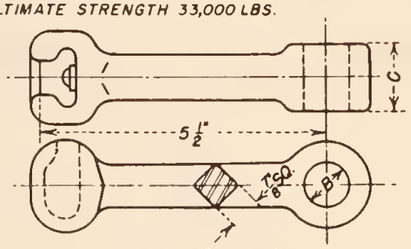
TURNBUCKLE
PART NO. 89.20
ULTIMATE STRENGTH 25,000 LBS.



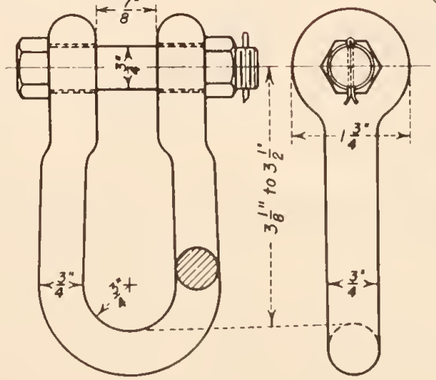
TURNBUCKLE
PART NO. 89.25
ULTIMATE STRENGTH 33,000 LBS.



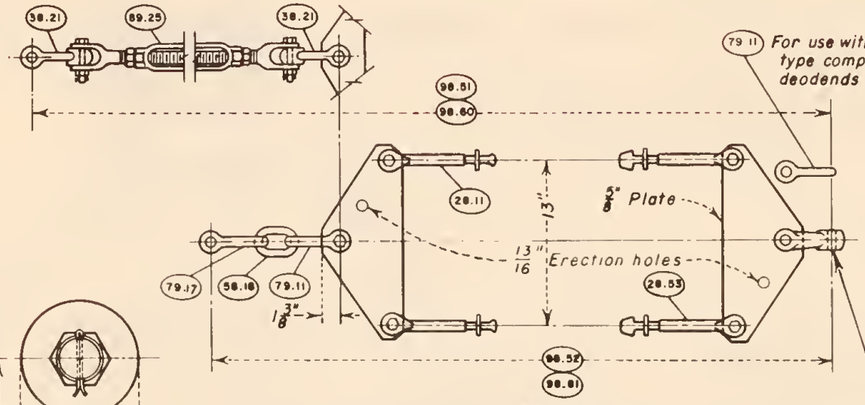
BALL EYE
PART NO. 38.10
ULTIMATE STRENGTH 25,000 LBS.



SOCKET – EYE
PART NO. 38.52, 38.53, 38.54, 38.55
ULTIMATE STRENGTH 33,000 LBS.



ANCHOR SHACKLE
PART NO. 79.11
ULTIMATE STRENGTH 36,000 LBS.



DOUBLE YOKE ASSEMBLIES
PART NO. 98.51, 98.52, 98.60, 98.61
ULTIMATE STRENGTH 33,000 LBS.

For use with compression, clevis type, deodends △

- 38.19 — 266.8, 300.0 MCM 26/7
- 38.20 — 336.4, 397.5 MCM 26/7
- 38.21 — 477.0, 556.5 MCM 24/7; 605.0, 636.0 MCM 26/7; 795.0 MCM 45/7
- 38.22 — 795.0 MCM 26/7; 954.0 to 1272 MCM All strandings
- 38.24 — For use with strain clamps

EXPLANATION

✲✲ For use with stroin clamps, dimensions "B" and "C" shall be suitable and odequate to fit clevis fitting of strain clamp.
✲ Turnbuckles required only where specified. All moterial shall be galvanized after drilling and forging in accordance with A.S.T.M. Designation A-153.
△ Fittings based on ALCOA conductor dead-ends.
♦ Yokes shall have full radius edges and corners, hot-line fittings shall be heat treated, with 30,000# ultimate strength.

B	6-24-81 A2-	CHANGED DRAWING REFERENCE ON PART NO. 79.17
A	8-8-79 A2-	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

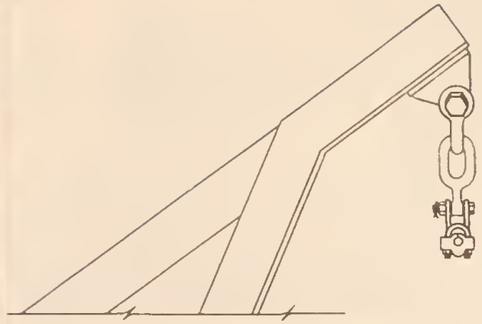
STANDARD DESIGNS
TRANSMISSION LINES
STEEL TOWERS
CONDUCTOR AND OVERHEAD GROUND WIRE HARDWARE DETAILS

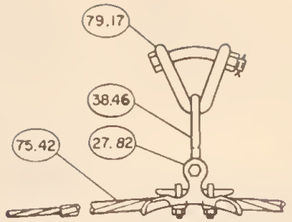
DESIGNED A.D.S.-E.M.S.F. SUBMITTED
DRAWN H.E.W. RECOMMENDED
CHECKED C.A.C. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1976 | E40-D-5271

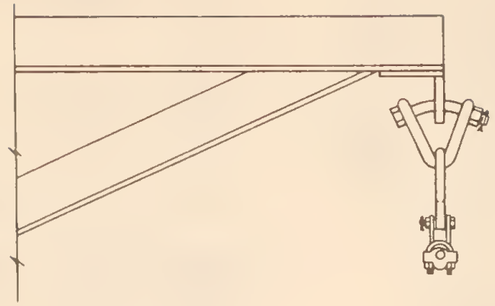
AUGUST 6, 1979 | 41 | 1005

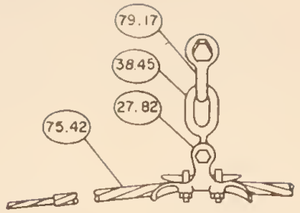
44





DETAIL A
(OGW ATTACHMENT PLATE
AT RIGHT ANGLE TO OGW)





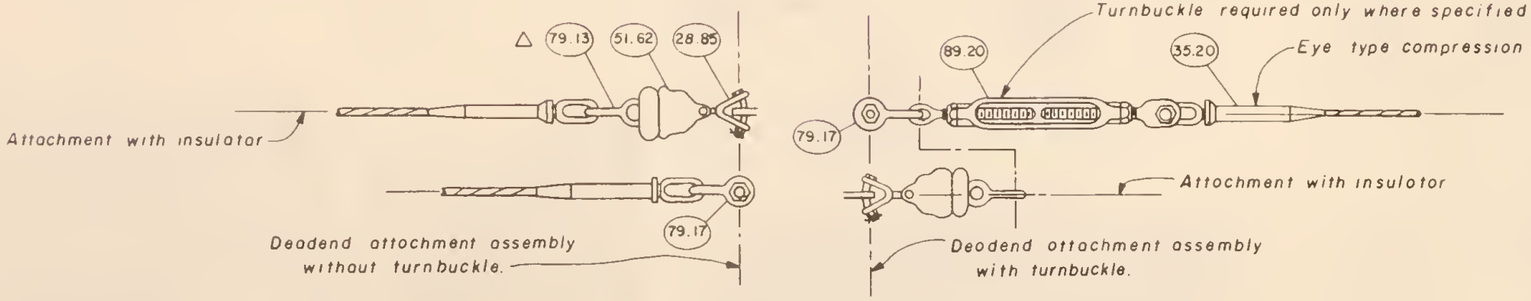
DETAIL B
(OGW ATTACHMENT PLATE
IN PLANE OF OGW)

* PART NO.	DESCRIPTION	DWG. NO. 41
27.82	Clamp suspension	
28.85	Y-Clevis eye, O.B 85450 or equal	
35.20	Deadend compression, eye type	
38.45	Eye, Ovol eye, B.T.-3007-T or equal	
38.46	Eye, Oval eye 90°, B.T.3007 or equal.	
51.62	Insulator, ground wire, as specified.	
75.42	Rods, armor, performed for steel O G W	
79.13	Shackle, anchor type.	1005
79.17	V-Shackle, Lindsey Cat No 3203 or equal	
89.20	Turnbuckle, clevis-eye.	1005

NOTES

* All hardware fittings to be furnished with hex bolt, hex nut, and key.

△ When strain clamp is used omit Part No 79.13.



TOWER DEADEND ATTACHMENT

D	9-3-80 A2-ME	REVISED REFERENCE DRAWING NUMBERS
C	7-11-80 A2-ME	REVISED FOR MINOR REVISIONS
B	1-16-80 A2-ME	REVISED V-SHACKLE REFERENCE
A	6-6-79 A2-ME	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK
E	10-28-83 A2-TC	CORRECTED PART NOS. 38.45 & 38.46, REVISED NOTES.

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS
TRANSMISSION LINES
STEEL TOWER
OVERHEAD AND GROUND WIRE ATTACHMENT DETAIL

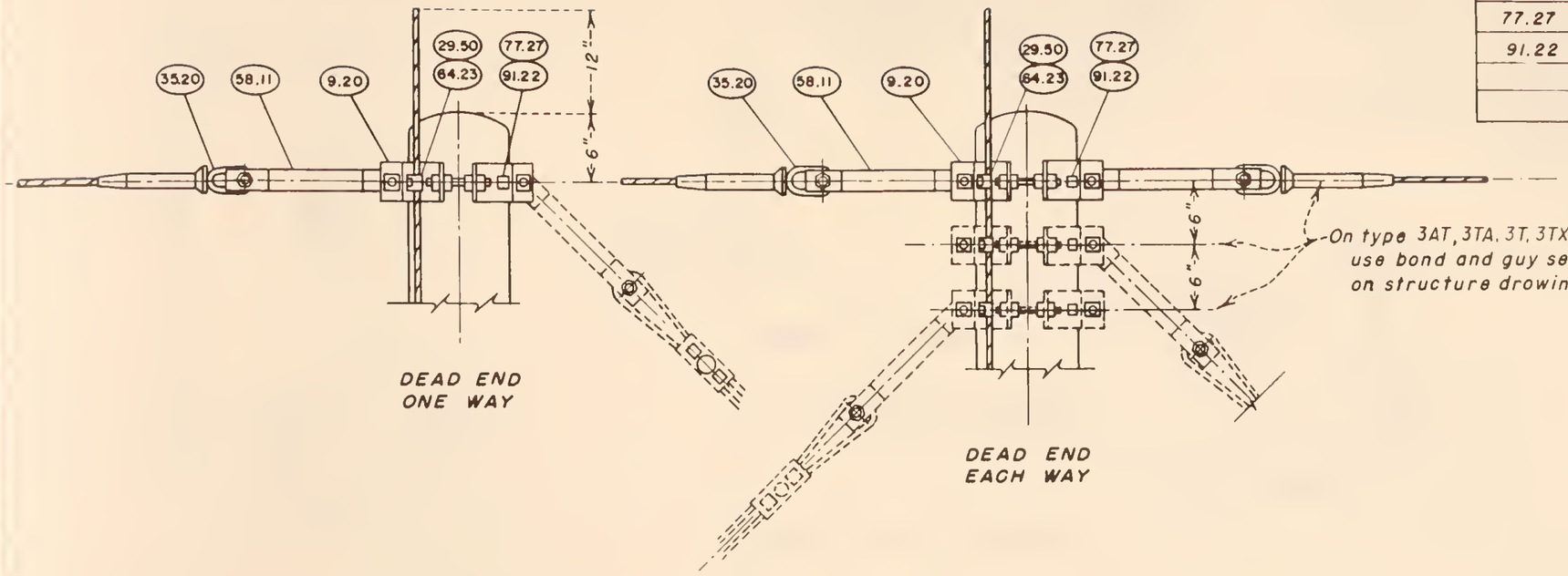
DESIGNED E.F.P. SUBMITTED Alan Lucas
DRAWN E.H.R. RECOMMENDED B Bryan
CHECKED K.T.O. APPROVED C A Label
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO JUNE 16, 1978 | E40-D-4422

AUGUST 6, 1979 | 41 | 1006

OVERHEAD GROUND WIRE MATERIAL

PART NO.	DESCRIPTION	OWG. NO. 41
9.20	Bond, four-way strain	6030
29.50	Clip, ground, with $\frac{3}{4}$"x$2\frac{1}{2}$" cone head bolt	6030
35.20	Compression dead end, eye-type for OGW	
58.11	Link, connecting pair	6030
64.23	Locknut for $\frac{3}{4}$" bolt	
77.27	Lag screw, $\frac{1}{2}$"x4," fetter drive thread	
91.22	Washer, round flat, $1\frac{3}{8}$" O.D., $\frac{9}{16}$" hole	



On type 3AT, 3TA, 3T, 3TX and 4BT structures, use bond and guy sequence as shown on structure drawings.

TYPICAL OGW ATTACHMENT USING EYE-TYPE COMPRESSION DEAD ENDS

REFERENCE DRAWINGS

	115 KV	138-161 KV
TYPE HS	41 6010	41 6006
TYPE HSB	41 6011	41 6007
TYPE 3AT	41 6074	41
TYPE 3T	41 6075	41
TYPE 3OE	41 6004	
TYPE 3TX	41	
TYPE 4BT	41	
TYPE 4S	41	
TYPE 3TA	41 6016	41 6018

B	8-17-82 AE-NM	CHANGED DRAWING REFERENCE NUMBERS
A	6-79 AE-NM	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

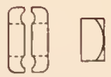
STANDARD DESIGNS

TRANSMISSION LINES
WOOD POLE--DEAD END DETAILS FOR OVERHEAD GROUND WIRE

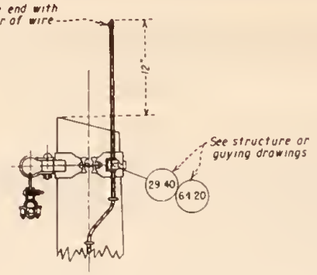
DESIGNED F.F.P. SUBMITTED
DRAWN W.G.C. RECOMMENDED
CHECKED K.T.O.-D.C.M. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1976 | E40-D-5764

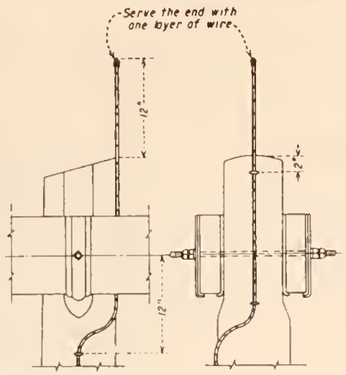
AUGUST 6, 1979 | 41 | 6042



PART NUMBERS 27.21 AND 27.22
BOLT GROUNDING CLAMP



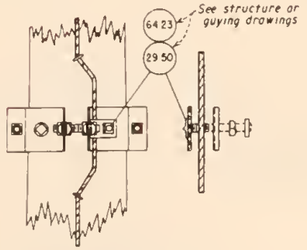
CONNECTION TO POLE TOP BAND



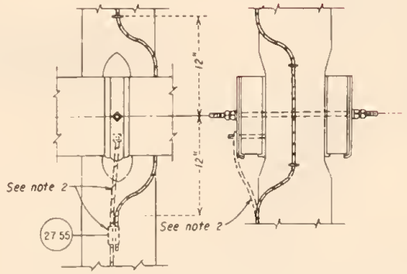
TYPICAL POLE TOP INSTALLATION OF POLE GROUND WIRE ON STRUCTURE WITHOUT OGW

LIST OF MATERIAL

PART NO	DESCRIPTION	
27 55	CLAMP, PARALLEL GROOVE, 2-BOLT COPPER ALLOY OR COPPER CRIMPIT, BURNDY TYPE YC-C, OR EQUAL	
75 46	NO 2 AWG, 30% CONDUCTIVITY, COPPERWELD WIRE	
81 13	COPPERWELD STAPLES	0.144 MIN DIAMETER OF WIRE 1 3/4-INCHES LONG, 1/2-INCH OPENING
27 21	BOLT GROUNDING CLAMP 3/4" BOLT TO NO 2 AWG, CWO, GALVANIZED	
27 22	BOLT GROUNDING CLAMP 7/8" BOLT TO NO 2 AWG, CWO, GALVANIZED	



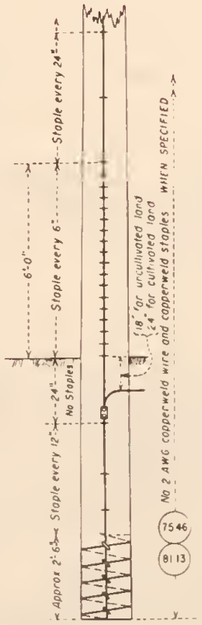
CONNECTION TO FOUR WAY POLE BAND



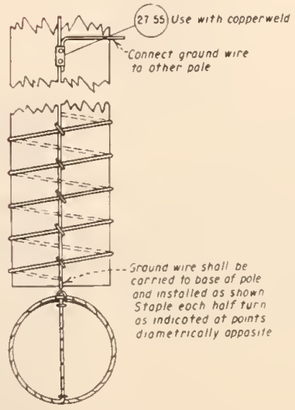
TYPICAL POLE TOP INSTALLATION OF POLE GROUND WIRE ON STRUCTURE WITH OGW

NOTES

1 Install ground wire on face of pole as indicated on individual structure drawings.
2 For 230-kV structures only



2 AND 3-POLE STRUCTURES


27 55 Use with copperweld
Connect ground wire to other pole
Ground wire shall be carried to base of pole and installed as shown Staple each half turn as indicated at points diametrically opposite

POLE BUTT WRAPPING DETAIL

A	8-6-79 AZ-645	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

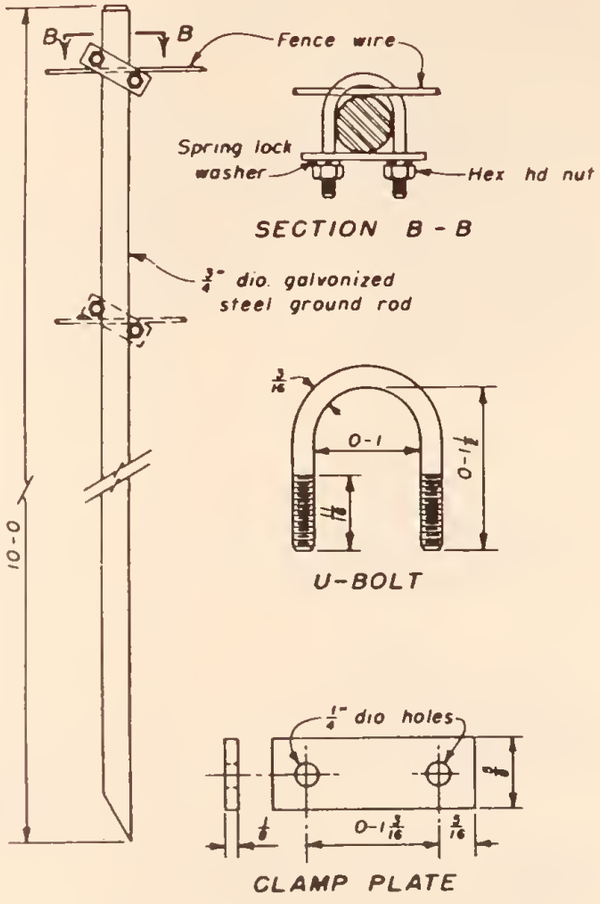
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS
TRANSMISSION LINES
WOOD-POLE STRUCTURES
GROUNDING DETAILS

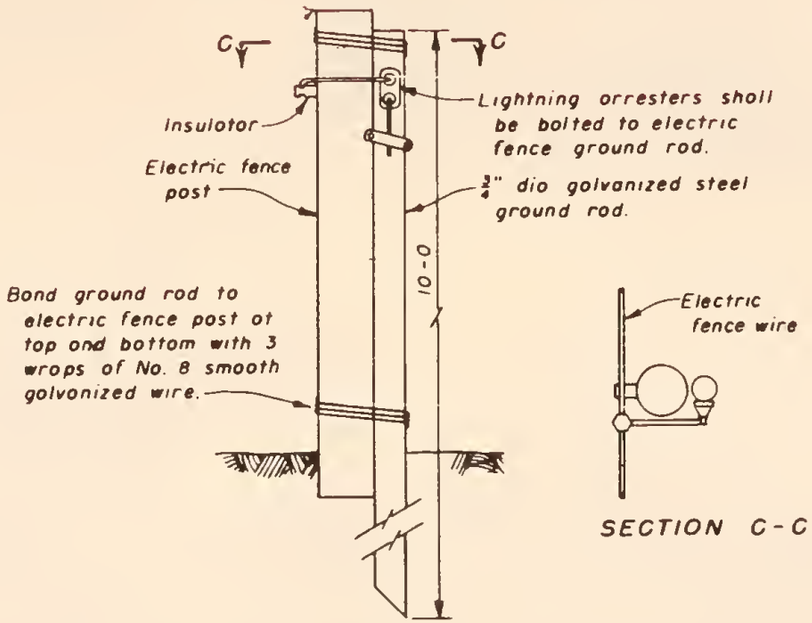
DESIGNED FFP — SUBMITTED Lloyd A. Engreen
DRAWN JJM JR — RECOMMENDED Donald D. Duncan
CHECKED ATD-DCW — APPROVED L. A. Lokse
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO, AUGUST 23, 1978 | E40-D-4978

AUGUST 6, 1979 | 41 | 1012



NON-ELECTRIC FENCE GROUNDING


C
C
Insulator
Lightning arresters shall be bolted to electric fence ground rod.
Electric fence post
3/4" dia galvanized steel ground rod.
10-0
Bond ground rod to electric fence post at top and bottom with 3 wraps of No. 8 smooth galvanized wire.
Electric fence wire
SECTION C-C

ELECTRIC FENCE GROUNDING

NOTES

1. Ground rods and hardware shall be made of steel and galvanized in accordance with A.S.T.M. Designation A 153.
2. Clamp assembly includes u-bolt, clamp plate, two spring lockwashers and two hex. nuts.
3. Use one clamp assembly, for each fence wire.
4. Electric fences shall be grounded only through lightning arresters as shown. Lightning arresters shall be especially designed for use with electric fences. Ground rods shall be driven as close as possible to, and bonded to, electric fence posts.
5. Remove scale and rust and then coat with no-oxide compound, all fence wire surfaces which contact clamp assemblies.

A	8-6-79 A2-BTE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

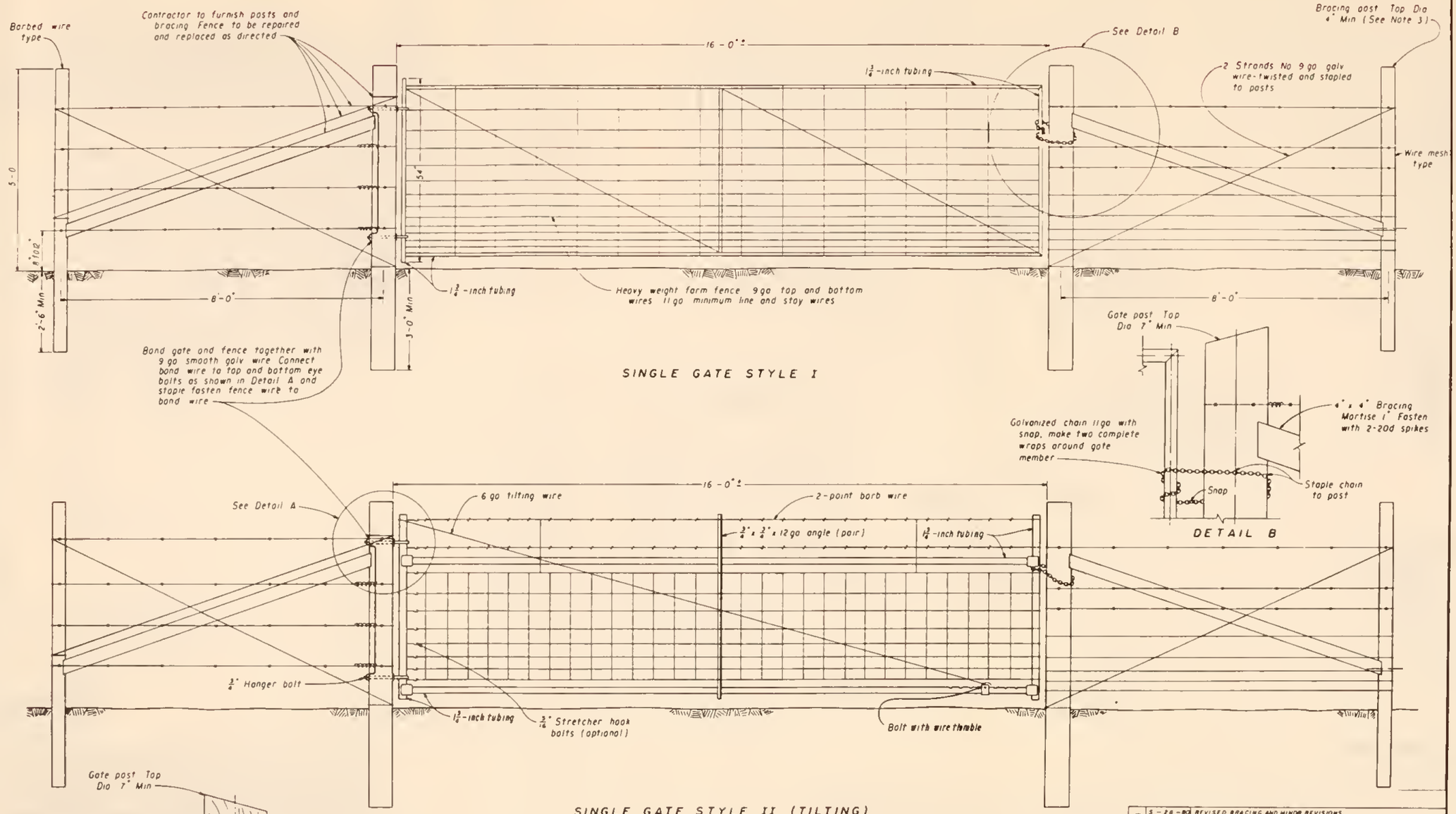
STANDARD DESIGNS
TRANSMISSION LINES
FENCE GROUNDING HARDWARE

DESIGNED W.W.D. SUBMITTED
DRAWN J.M.F. RECOMMENDED
CHECKED E.R.V. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1978 | E40-D-5017

AUGUST 6, 1979 | 41 | 1011

48


Barbed wire type
Contractor to furnish posts and bracing Fence to be repaired and replaced as directed
16 - 0" ±
See Detail B
Bracing post Top Dia 4" Min (See Note 3)
1¾-inch tubing
2 Strands No 9 ga galv wire-twisted and stapled to posts
5'-0
Wire mesh type
54"
8'-0"
2'-6" Min
3'-0" Min
1¾-inch tubing
Heavy weight farm fence 9 ga top and bottom wires 11 ga minimum line and stay wires
Bond gate and fence together with 9 ga smooth galv wire Connect bond wire to top and bottom eye bolts as shown in Detail A and staple fasten fence wire to bond wire
Gate post Top Dia 7" Min
4" x 4" Bracing Mortise 1" Fasten with 2-20d spikes
Galvanized chain 11 ga with snap, make two complete wraps around gate member
Snap
Staple chain to post
DETAIL B
See Detail A
16 - 0" ±
6 ga tilting wire
2-point barb wire
¾" x ¾" x 12 ga angle (pair)
1¾-inch tubing
¾" Hanger bolt
1¾-inch tubing
⅜" Stretcher hook bolts (optional)
Bolt with wire thimble
Gate post Top Dia 7" Min
⅛" x 2" Washers
¾" Eye bolt Thread 2"
10"
Bonding wire
4" x 4" Bracing
Mortise 1" Fasten with 2-20d spikes
DETAIL A

SINGLE GATE STYLE I

SINGLE GATE STYLE II (TILTING)

NOTES

1. All materials used in the gate shall be Zinc coated (galvanized) except that galvanizing repair paint may be used over welds or to repair galvanizing damaged by welding operations. Surfaces to which repair paint is to be applied shall be cleaned by wiping with a cloth saturated with mineral spirits of xylene, followed by wire brushing. After wire brushing, the area shall be recleaned with solvent to remove residue, and shall be given one heavy brush coat of galvanizing repair paint.
2. All tubing used in the gate frame shall be 1¾-inch high carbon steel with a minimum thickness of 0.090 inch, shall be continuous welded, and shall be galvanized inside and out.
3. Gate posts and bracing posts are included as a part of construction of the gate and shall be well-seasoned cedar or a type that has been pressure treated with a preservative. The pressure treated posts shall be Douglas Fir, Western Larch, Lodgepole Pine, or Southern Yellow Pine.

B	5-28-80 42-AKE	REVISED BRACING AND MINOR REVISIONS
A	8-8-78 42-AKE	ADDED W A P A DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

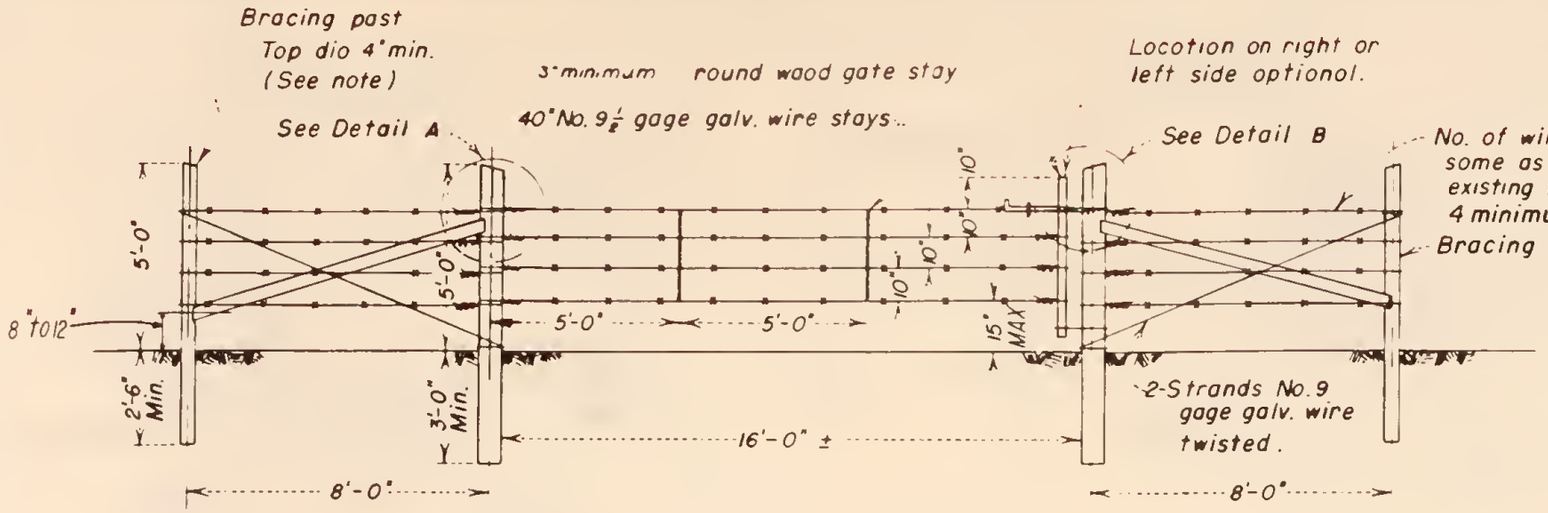
STANDARD DESIGNS

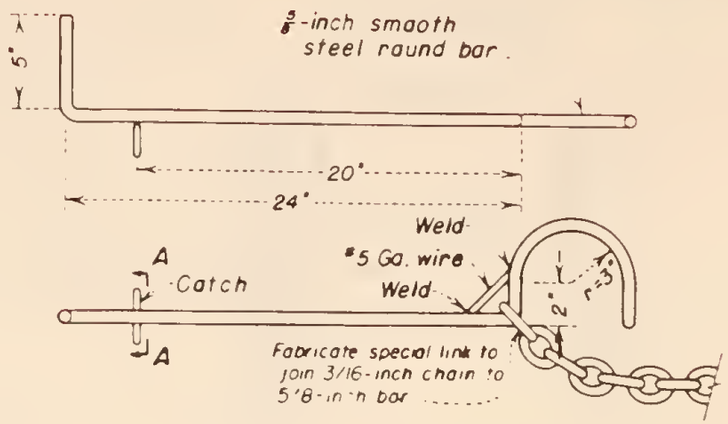
TRANSMISSION LINES
PREFABRICATED STEEL GATES
FOR RIGHT-OF-WAY FENCES

DESIGNED	F.F.P. -4.0.5	SUBMITTED	A.K. Engrs.
DRAWN	W.L.B.	RECOMMENDED	Chief, Electrical Design Branch
CHECKED	F.P.	APPROVED	C.E. Electrical Design Branch

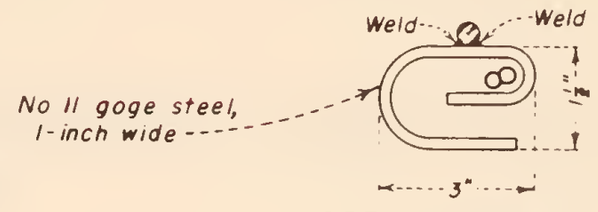
GOLDEN, COLORADO — AUGUST 16, 1978 — E40-D-4947

AUGUST 6, 1979 — 41 — 9000

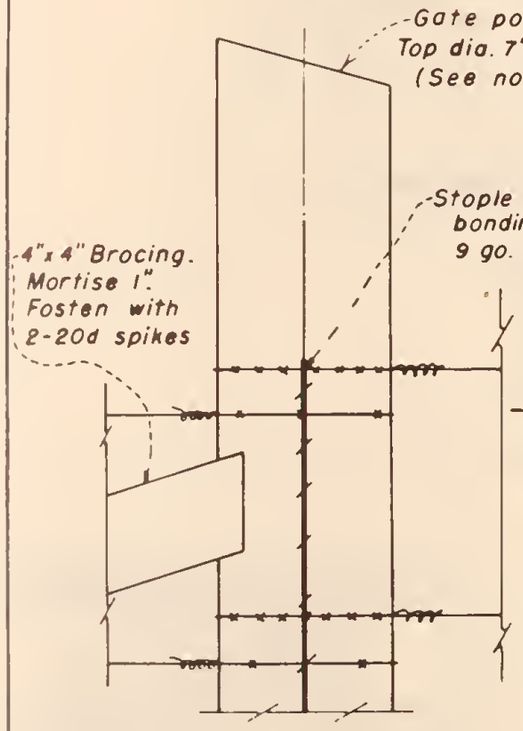




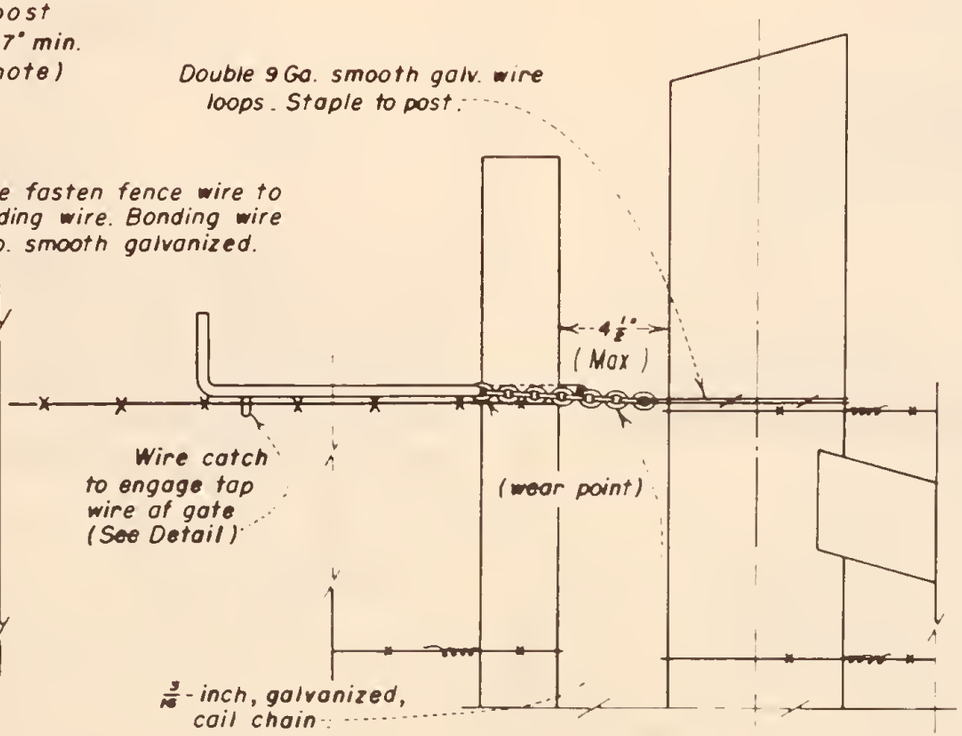
DETAIL OF GATE CLOSER



DETAIL OF CATCH
(Section A-A)



DETAIL A



DETAIL B

NOTES

Gote posts and bracing posts are included as part of construction of the gote ond shall be well-seasoned cedar or a type thot hos been pressure treoted with a preservotive. The pressure treoted pasts shall be Douglos Fir, Western Lorch, Lodgepole Pine, or Southern Yellow Pine.

Gate closer sholl be galvonized in occordance with A.S.T.M. Designotion A-153.

C	3-28-80 AE-AE	REVISED BRACING AND MINOR REVISIONS
B	1-16-80 AE-AE	REVISED NOTE ON NUMBER OF WIRES ON GATE
A	8-6-79 AE-AE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

STANDARD DESIGNS

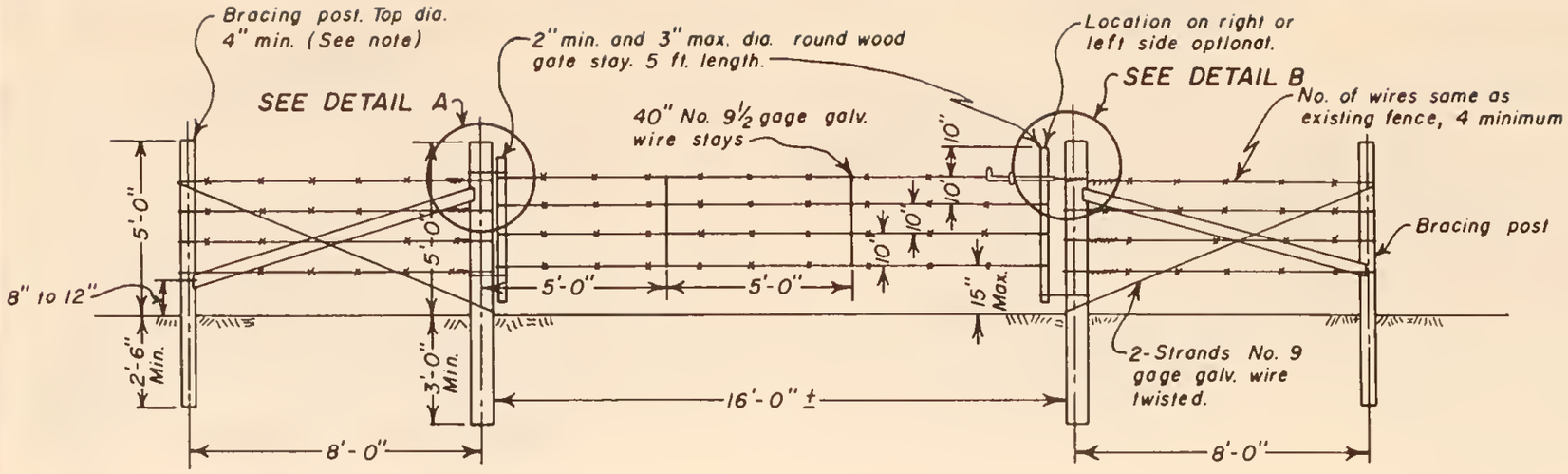
TRANSMISSION LINES
BARBED WIRE GATE
FOR RIGHT-OF-WAY FENCES

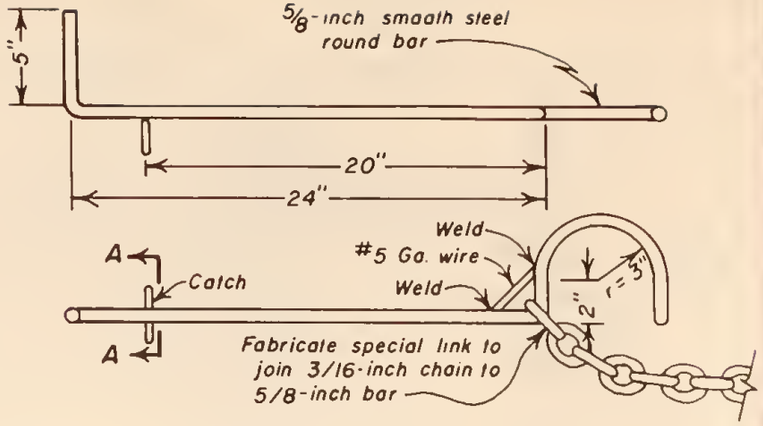
DESIGNED M A B SUBMITTED
DRAWN M E W RECOMMENDED
CHECKED D C M - K T O APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 23, 1979 | E40-D-5108

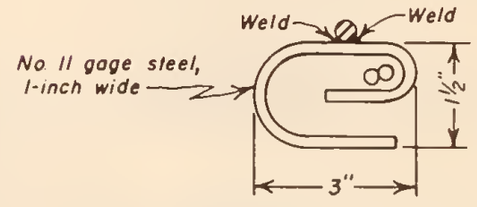
AUGUST 6, 1979 | 41 | 9002

50

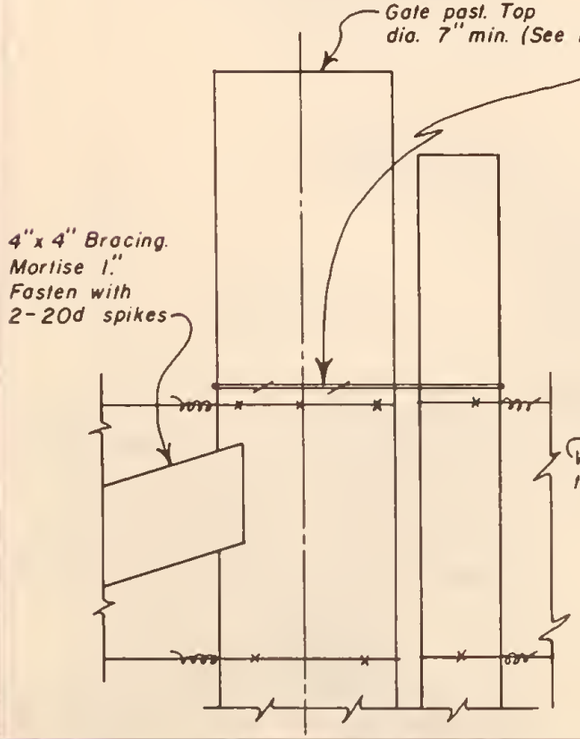




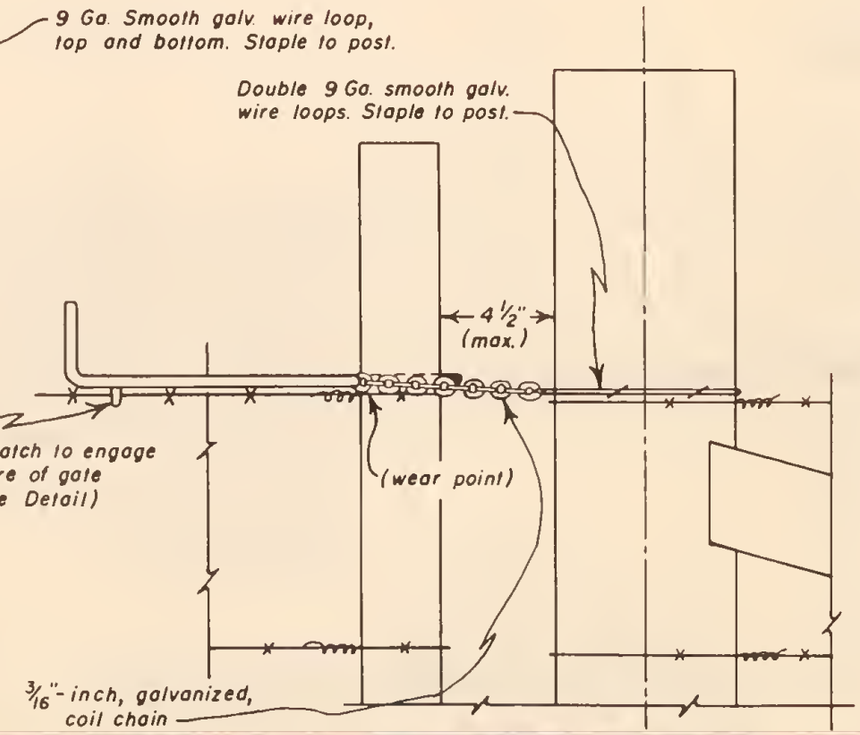
DETAIL OF GATE CLOSER



DETAIL OF CATCH
(Section A-A)


Gate post. Top dia. 7" min. (See note)
9 Ga. Smooth galv. wire loop, top and bottom. Staple to post.
4"x 4" Bracing. Mortise 1". Fasten with 2-20d spikes

DETAIL A


Double 9 Ga. smooth galv. wire loops. Staple to post.
4½" (max.)
Wire catch to engage top wire of gate (See Detail)
(wear point)
3/16"-inch, galvanized, coil chain

DETAIL B

NOTES

Gate posts and bracing posts are included as part of construction of the gate and shall be well-seasoned cedar or a type that has been pressure treated with a preservative. The pressure treated posts shall be Douglas Fir, Western Larch, Lodgepole Pine, or Southern Yellow Pine.

Gate closer shall be galvanized in accordance with A. S. T. M. Designation A-153.

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
BILLINGS CONSTRUCTION - HURON, SOUTH DAKOTA

STANDARD DESIGNS

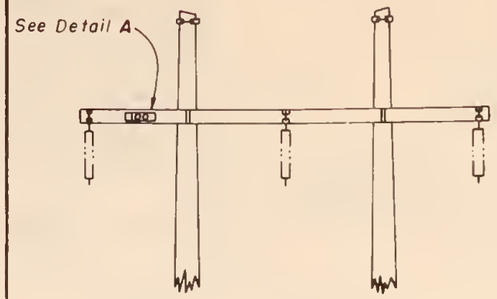
TRANSMISSION LINES

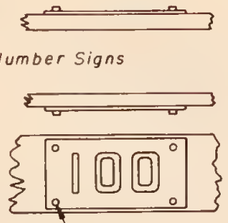
BARBED WIRE GATE FOR OFF RIGHT-OF-WAY ACCESS FENCES

DESIGNED G.O.D. RECOMMENDED
DRAWN M.J.TSCHETTER APPROVED
CHECKED D.A.MAGSTADT ASST AREA MGR FOR CONST

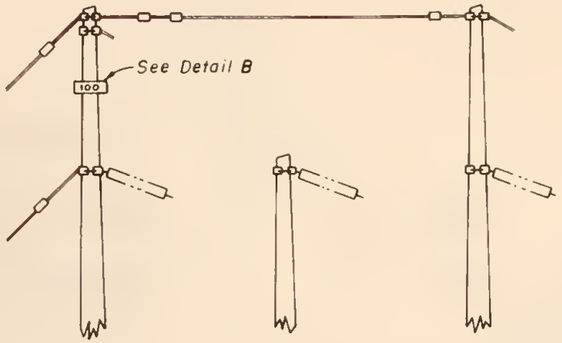
NOVEMBER 30, 1982	41	9020

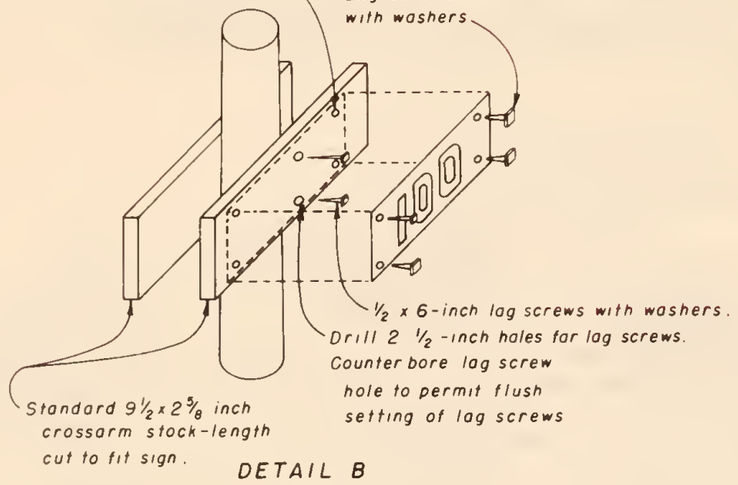
NUMBER SIGN LOCATION AND MOUNTING DETAILS FOR WOOD POLE STRUCTURES



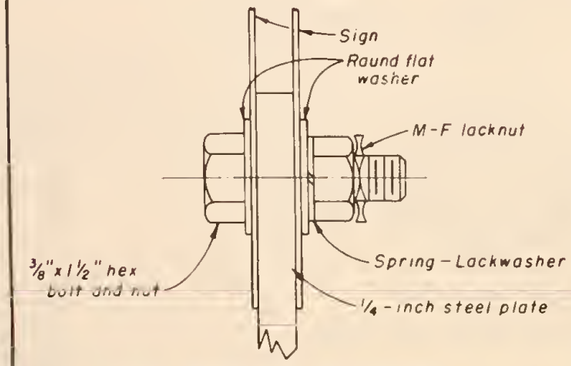


DETAIL A



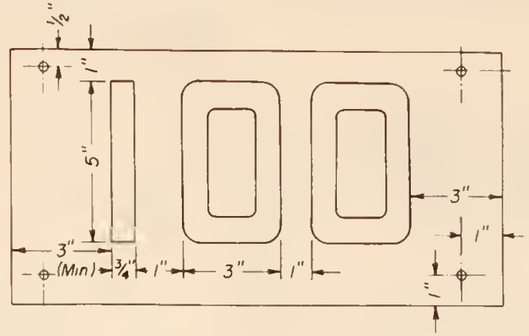

Drill 3/16-inch pilot holes for lag screws
1/4 x 1 1/4-inch Lag screws with washers
100
1/2 x 6-inch lag screws with washers.
Drill 2 1/2-inch holes for lag screws. Counter bore lag screw hole to permit flush setting of lag screws
Standard 9 1/2 x 2 5/8 inch crossarm stock-length cut to fit sign.

DETAIL B



SIGN MOUNTING HARDWARE

NUMBER SIGN SPECIFICATIONS



1. Signs shall be made of No. 18 U.S. Gauge sheet steel
2. Finish shall be porcelain enamel
   Background color shall be yellow. Figures shall be black.
3. Figures shall be of the "block" type, 5-inches high and 3-inches wide
   Body lines shall be 3/4-inch wide
4. Each sign shall have four finished holes large enough to take 3/8-inch bolts. Holes in signs shall be fitted with brass eyelets.
5. Each sign shall be 8-inches high, width may vary as follows
   For three digit signs such as 200, width shall be 17-inches;
   For three digit signs such as 100, width shall be 15-inches,
   For two digit signs such as 20, width shall be 13-inches;
   For one digit signs such as 2, width shall be 9-inches.
6. The porcelain enamel shall be in accordance with the recommended standards for Manufacture of Porcelain Enamel Signs (PEI S-103) of the Sign Division of the Porcelain Enamel Institute, Inc.

NOTES

1. Wood pole transmission lines patrolled from aircraft shall have the first structure of each mile section marked with two metal structure number signs mounted back to back as shown in Details A and B. Location and maunting details are general and may be madified to suit local conditions
2. All ferrous hardware shall be galvanized or cadmium plated.

A	8-6-79 A2-RKT	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINSTRATION
HEADQUARTERS — GOLDEN, COLORADO

STANDARD DESIGN

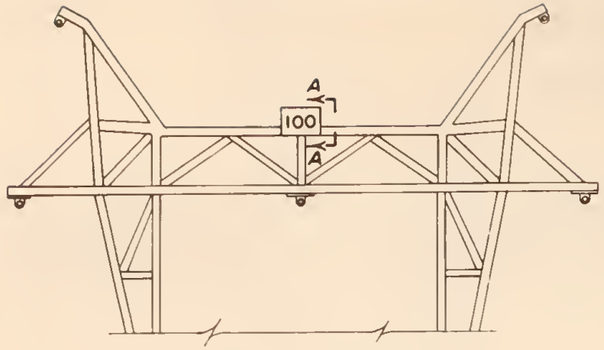
TRANSMISSION LINES
AERIAL PATROL NUMBER SIGNS
FOR WOOD POLE STRUCTURES
DETAILS AND LOCATION

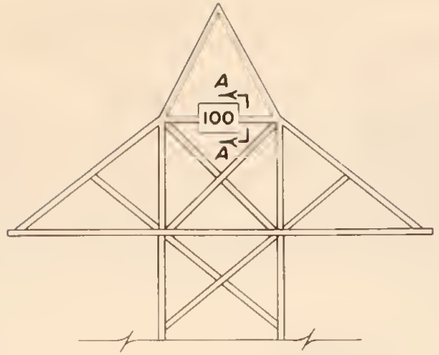
DESIGNED G.R.W. SUBMITTED
DRAWN B.G. RECOMMENDED
CHECKED T.M.A. D.C.M. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

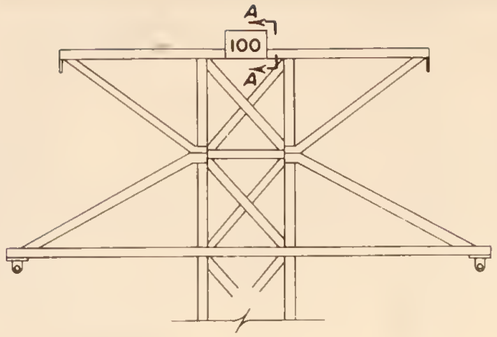
GOLDEN, COLORADO AUGUST 23, 1978 | E40-D-5174

AUGUST 6 1979 | 41 | 9004

52



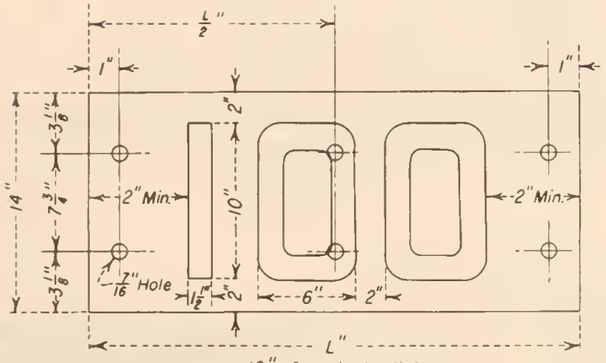




NUMBER SIGN LOCATION AND MOUNTING DETAILS FOR STEEL TOWERS

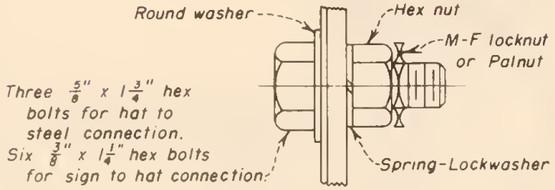
MATERIAL SPECIFICATIONS

1. Signs shall be made of No. 16 U.S. Gauge sheet steel.
2. Finish shall be porcelain enamel. Background color shall be yellow Figures shall be black.
3. Figures shall be of the "block" type, 10-inches high and 6-inches wide Body lines shall be $1\frac{1}{2}$"-inches wide
4. The porcelain enamel shall be in accordance with the recommended standards for Manufacture of Porcelain Enamel Signs (PEI.S-103) of the Sign Division of the Porcelain Enamel Institute, Inc.
5. All ferrous hardware shall be galvanized.

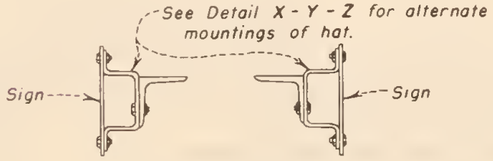


10" for single digit
18" for two digits
26" for three digits

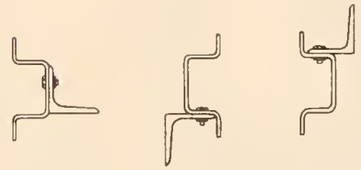
DETAIL A


Round washer
Hex nut
M-F locknut or Palnut
Three 5/8" x 1 3/4" hex bolts for hat to steel connection.
Six 3/8" x 1 1/4" hex bolts for sign to hat connection.
Spring-Lockwasher

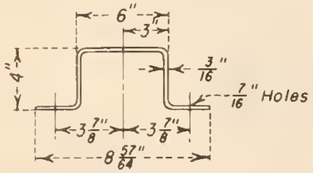
DETAIL B
MOUNTING HARDWARE
See Note 2



SECTION A-A
2 signs per tower



DETAIL X DETAIL Y DETAIL Z
See Detail B for mounting hardware



HAT SECTION
Length of hat shall be same as sign

NOTES

1. First structure of each mile section shall be marked with two metal aerial patrol number signs, one mounted each side of tower as shown above. Location and mounting details are general and may be modified to suit local conditions.
2. Holes for mounting hardware shall be $\frac{1}{16}$" larger than size of bolt used. Holes in signs shall be furnished and fitted with brass eyelets. Longitudinal spacing of all holes in hat sections including those for hat sections to steel connections shall be the same as used for signs.

A	8-6-79 A2-WAPA	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

ALWAYS THINK SAFETY

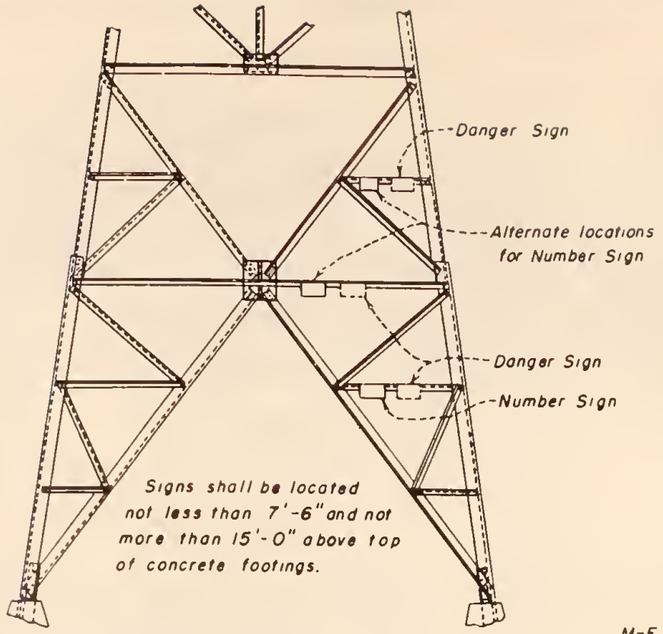
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
STANDARD DESIGNS

TRANSMISSION LINES
AERIAL PATROL NUMBER SIGNS FOR STEEL TOWERS DETAILS AND LOCATIONS

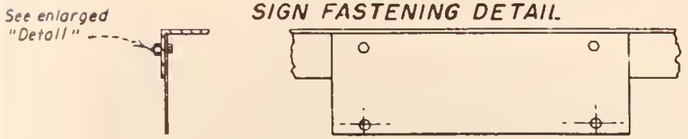
DESIGNED A.D.S. SUBMITTED
DRAWN J.M.H. RECOMMENDED
CHECKED C.A.C. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO AUGUST 31, 1978 | E40-D-6045

AUGUST 6, 1979 | 41 | 9005


Danger Sign
Alternate locations for Number Sign
Danger Sign
Number Sign
Signs shall be located not less than 7'-6" and not more than 15'-0" above top of concrete footings.

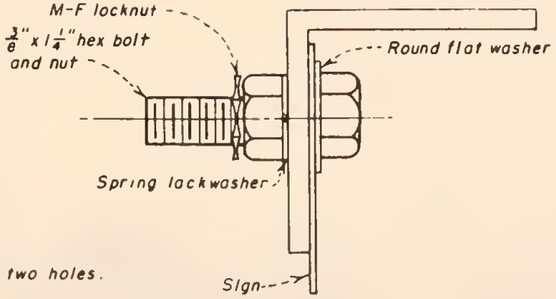
STRUCTURE NUMBER LOCATION



SIGN FASTENING DETAIL

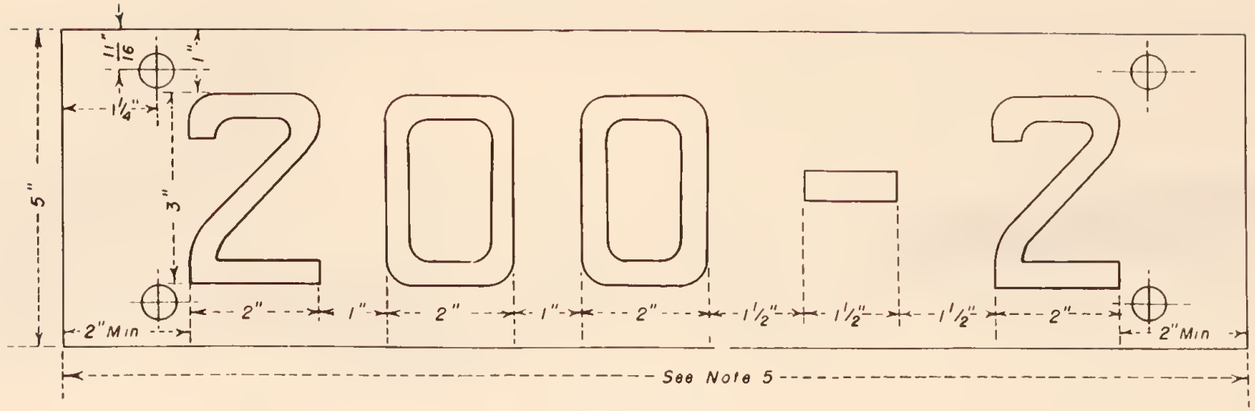
NOTES

1. Signs shall be fastened by means of either the top or the bottom two holes.
2. All ferraus hardware shall be galvanized.
3. See Drawing NaE40-D-6288 for locotion of signs on tubulor steel structures.



SIGN MOUNTING HARDWARE

NUMBER SIGN SPECIFICATIONS



NOTES (Cont.)

4. Signs shall be made of No 18 U.S. Gauge sheet steel.
5. Finish shall be porcelain enamel.
   Background color shall be yellow Figures shall be black
6. Figures shall be of the "block" type, 3 - inches high and 2 - inches wide Body lines shall be 1/2 - inch wide.
7. Each sign shall have four finished holes large enough to take 3/8 - inch bolts. Holes in signs shall be fitted with brass eyelets.
8. Each sign shall be 5 - inches high, width may vary as follows:
   For four digit signs such as 200-2, width shall be 18 1/2 - inches.
   For four digit signs such as 100-2, width shall be 17 - inches.
   For three digit signs such as 20-2, width shall be 15 1/2 - inches.
   For two digit signs such as 2-2, width shall be 12 1/2 - inches.
9. The porcelain enamel shall be in accordance with the recommended Standards for Manufacture of Porcelain Enamel Signs (PE1:S-103) of the Sign Division of the Porcelain Enamel Institute, Inc.

B	6-10-83 A2- RTE	REMOVED CADMIUM PLATING
A	8-6-79 A2- RTE	ADDED WAPA DRAWING NUMBER AND REVISED TITLE BLOCK

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

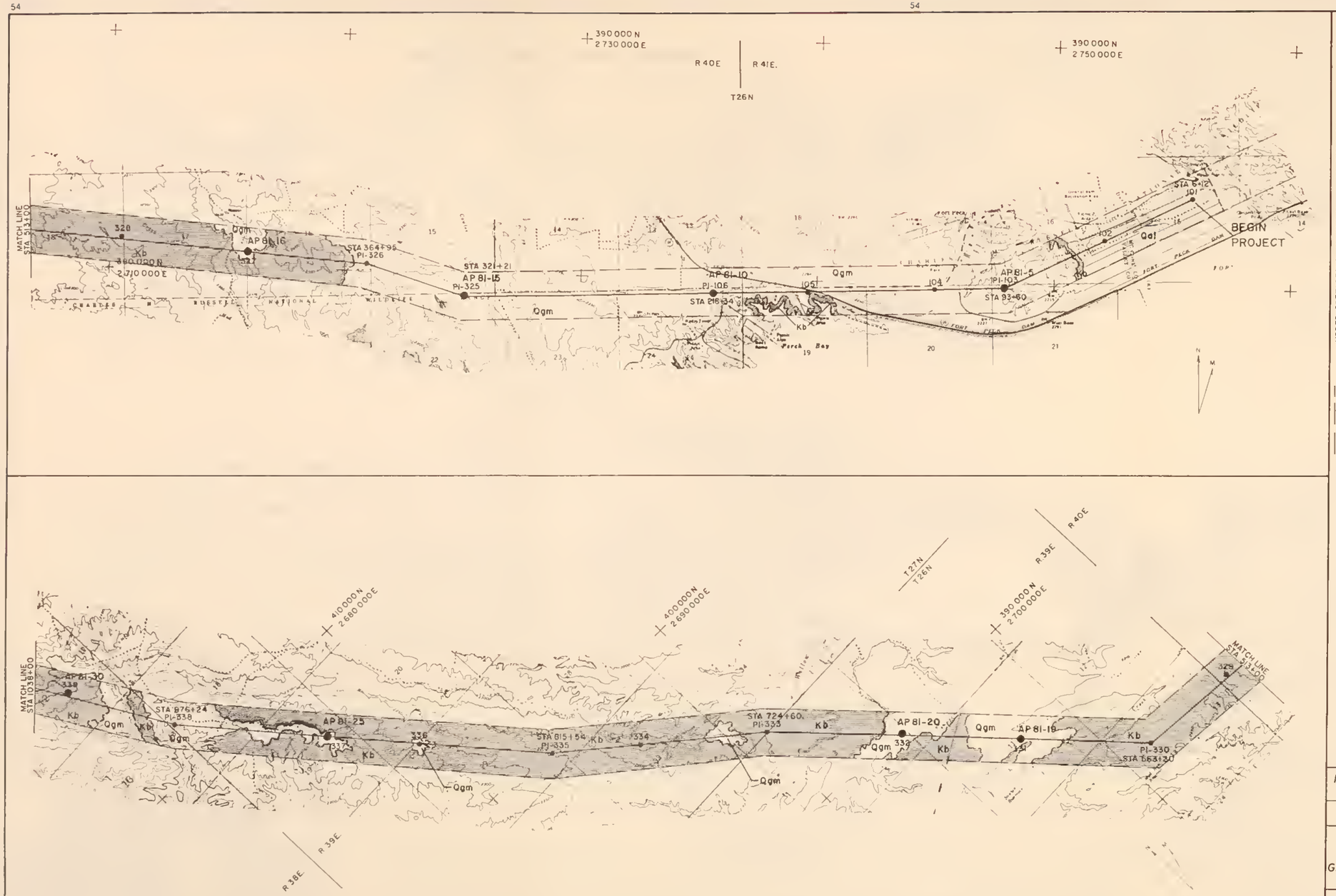
STANDARD DESIGNS
TRANSMISSION LINES
STRUCTURE NUMBER SIGNS
DETAILS AND LOCATION

DESIGNED M.C. SUBMITTED
DRAWN E.G.A. RECOMMENDED
CHECKED C.A.C. APPROVED
CHIEF, ELECTRICAL DESIGN BRANCH

GOLDEN, COLORADO JUNE 16, 1978 | E40-D-5762

AUGUST 6, 1979 | 41 | 9007

54



LEGEND

GEOLOGIC UNITS

QUATERNARY

- Qal — QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
- Qgm — QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
- Qac — QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL GENERALLY SHALLOW BEDROCK.

TERTIARY

- Tv — TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES

UPPER CRETACEOUS

- Kb — BEARPAW SHALE - SEMI CONSOLIDATED CLAYSTONE SHALE WEATHERING TO CLAY GUMBO
- Kjr — JUDITH RIVER FORMATION - SANDSTONE, SILTSTONE, SANDY AND SILTY SHALE

AN AREA OF EMBANKMENT FILL FOR THE FORT PECK DAM EXISTS SOUTH EAST OF THE TRANSMISSION LINE FROM STA 0+00 TO 60+00

OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP 81-100 — AUGER HOLE
- PR 81-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 3 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

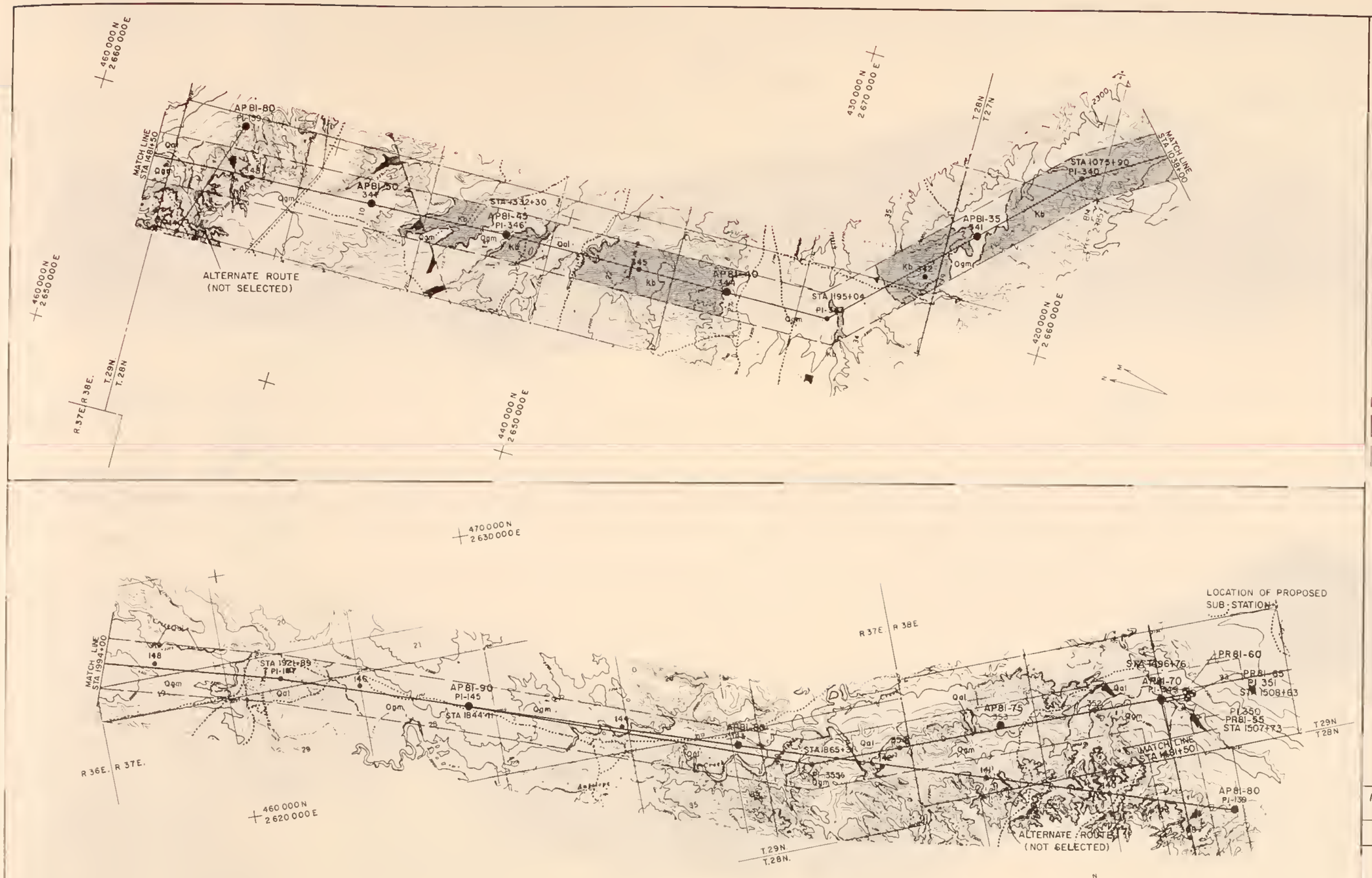
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 0+00 TO STATION 1038+00

GEOLOGY V. BED!	REVIEWED A. STILLEY
DRAWN R.J. Betz	APPROVED Larry D. Bell, Vice Pres NTL
CHECKED A. STILLEY	

DECEMBER 1981 | FP — HV | 8001



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SCALE

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NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

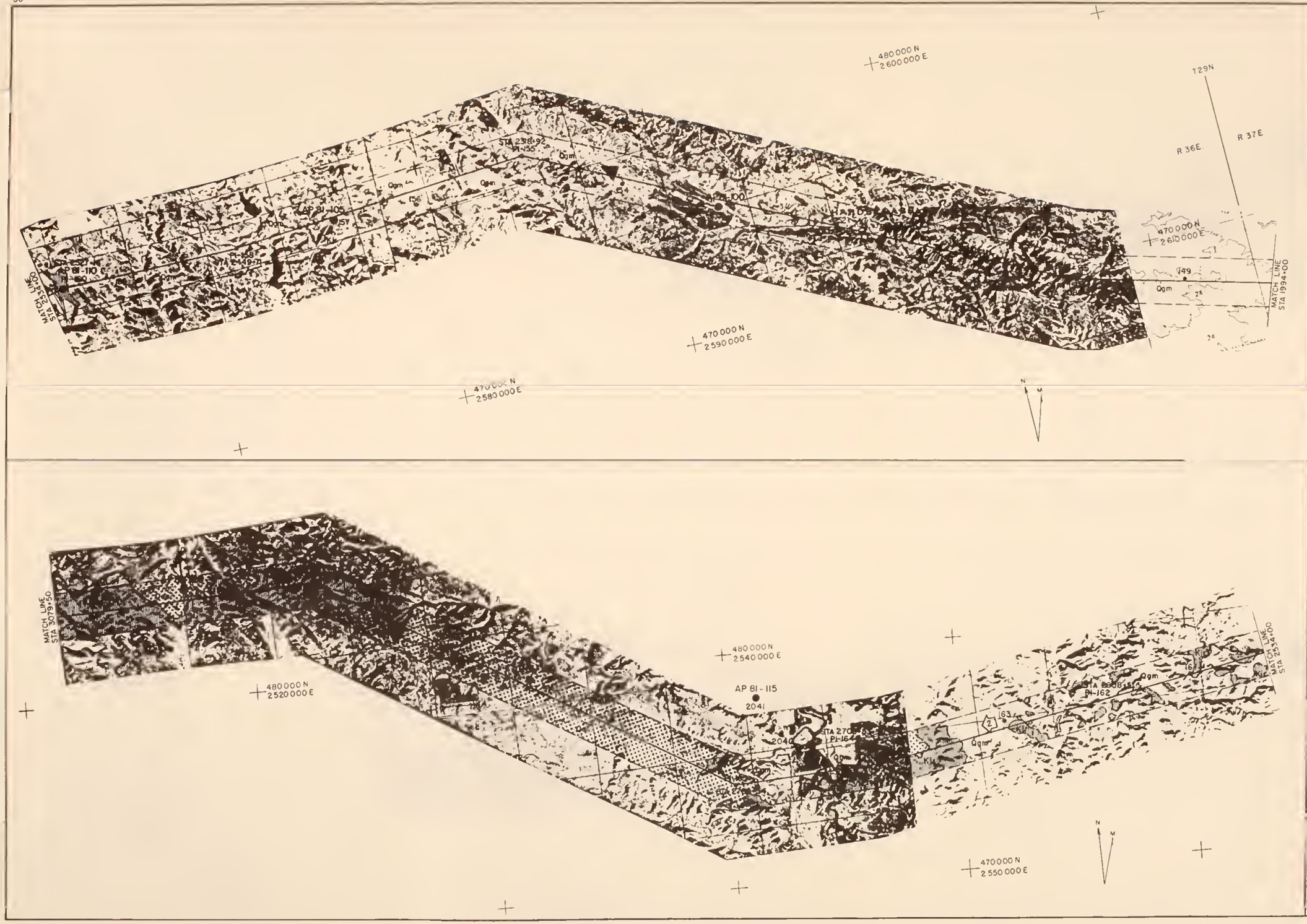
FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP

STATION 1038+00 TO STATION 1994+00

GEOLOGY V. BEDI	REVIEWED A. STILLEY	
DRAWN D.J. BETZ	APPROVED Larry H. O'Dell	
CHECKED A. STILLEY	Vice Pres, NTL	
DECEMBER 1981	FP — HV	8002

56



LEGEND

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SCALE

0 2000 4000
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DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC
BILLINGS, MONTANA

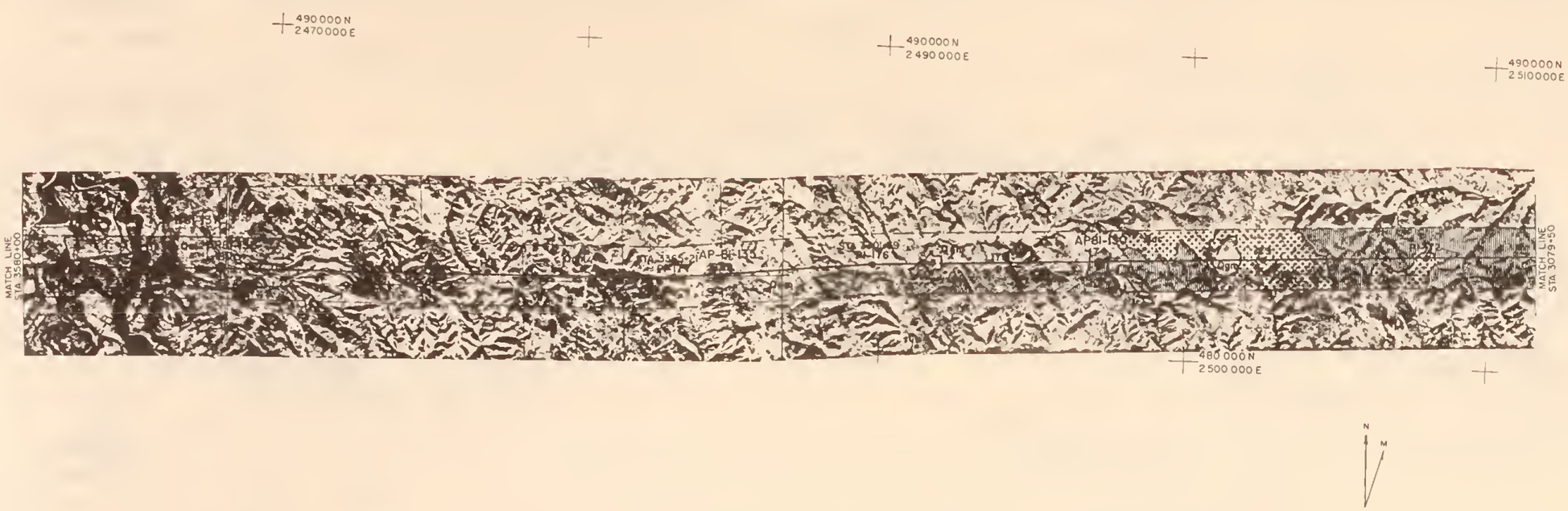
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 1994+00 TO STATION 3079+50

GEOLOGY V. BEDI
DRAWN D.J. BETZ
CHECKED A. STILLEY
REVIEWED A. STILLEY
APPROVED Vice Pres N.T.L

DECEMBER 1981 | FP — HV | 8003



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NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

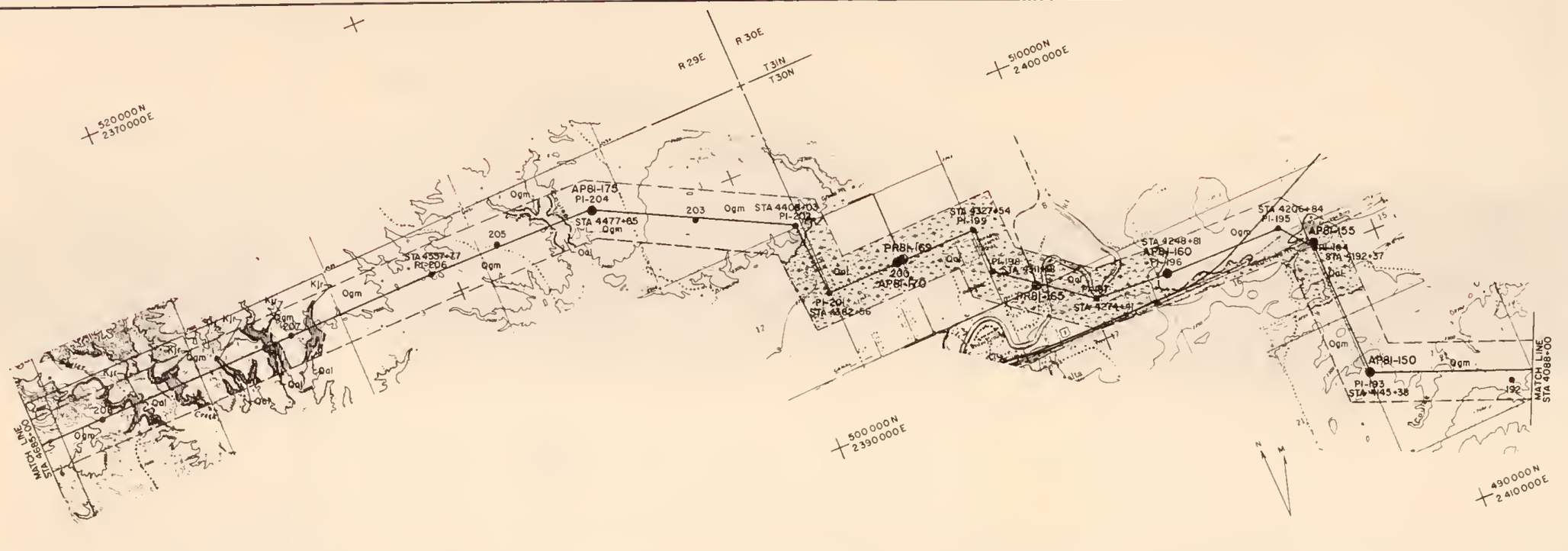
GEOLOGIC & EXPLORATIONS LOCATION MAP

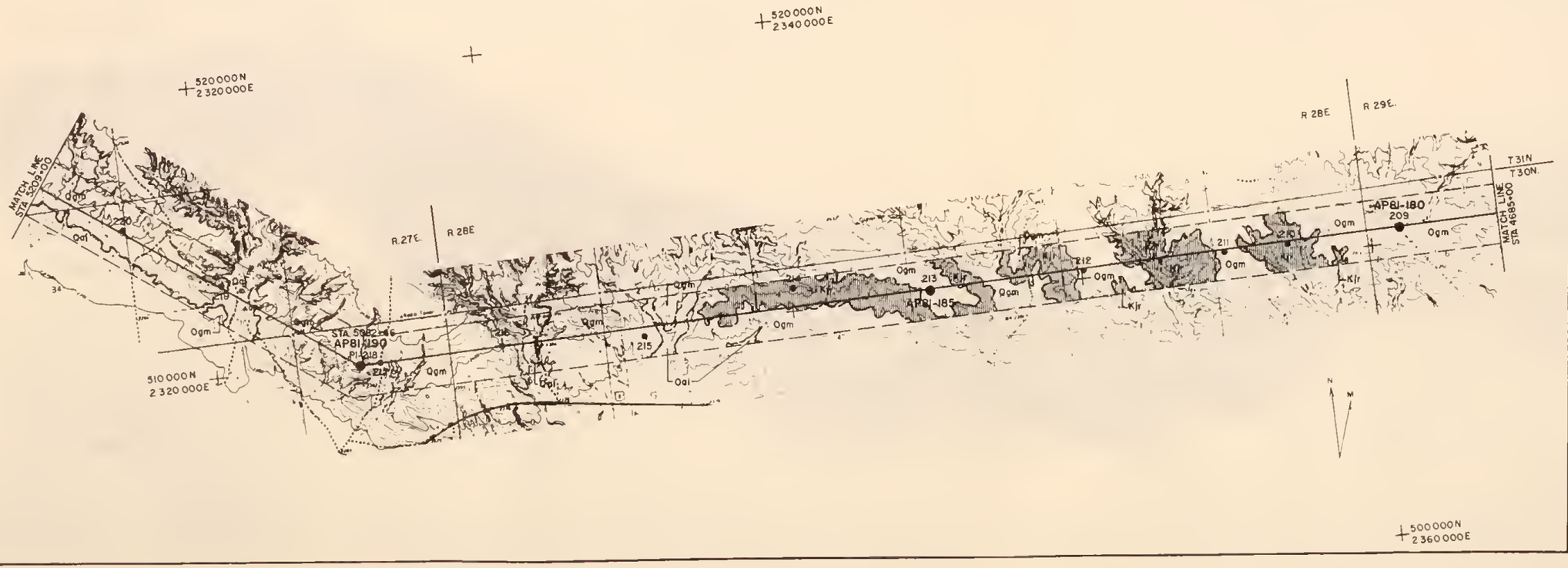
STATION 3079+50 TO STATION 4088+00

GEOLOGY V. BEDI	REVIEWED A. STILLEY
DRAWN D. J. BEITZ	APPROVED [signature] Vice Pres NTL
CHECKED A. STILLEY	

DECEMBER 1981	FP — HV	B004

58





LEGEND

GEOLOGIC UNITS

QUATERNARY

- Qal — QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
- Ogm — QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
- Qac — QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL. GENERALLY SHALLOW BEDROCK.

TERTIARY

- Tv — TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES

UPPER CRETACEOUS

- Kb — BEARPAW SHALE - SEMI CONSOLIDATED CLAYSTONE SHALE WEATHERING TO CLAY GUMBO
- Kjr — JUDITH RIVER FORMATION - SANDSTONE, SILTSTONE, SANDY AND SILTY SHALE

OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP 81-100 — AUGER HOLE
- PR 81-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 5 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM: USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

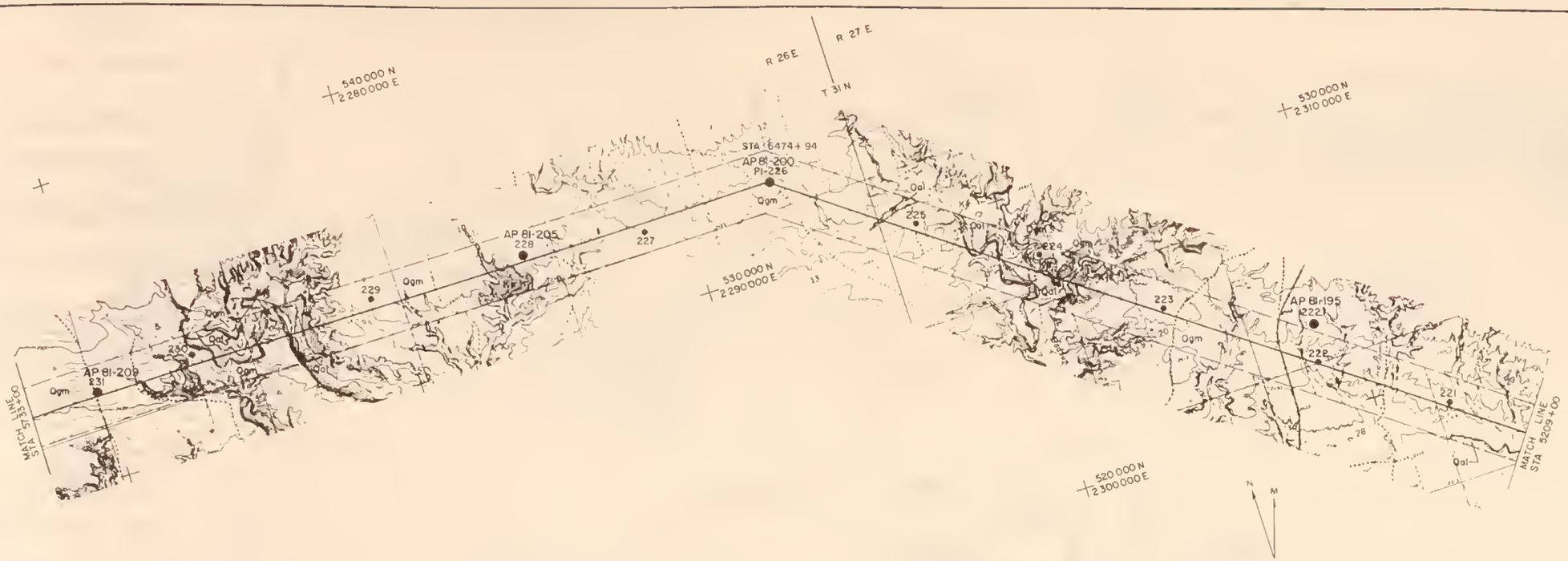
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

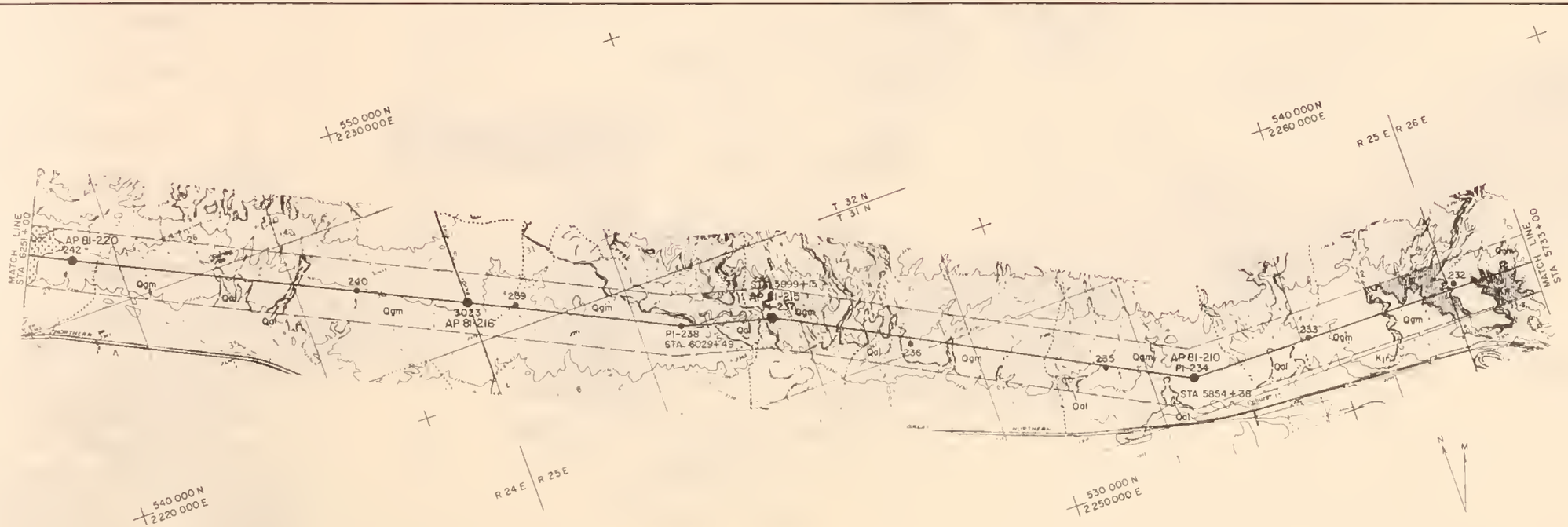
FORT PECK – HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 4088+00 TO STATION 5209+00

GEOLOGY	V. REDI	REVIEWED	A. STILLEY
DRAWN	D.J. BATE	APPROVED	Vice Pres N.T.L.
CHECKED	A. STILLEY		

DECEMBER 1981 | FP – HV | 8005





LEGEND

GEOLOGIC UNITS

QUATERNARY	Qal	QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
	Qgm	QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
	Qac	QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL GENERALLY SHALLOW BEDROCK
TERTIARY	Tv	TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES
UPPER CRETACEOUS	Kb	BEARPAW SHALE - SEMI CONSOLIDATED CLAYSTONE SHALE WEATHERING TO CLAY GUMBO
	Kjr	JUDITH RIVER FORMATION - SANDSTONE, SILTSTONE, SANDY AND SILTY SHALE

OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP 81-100 — AUGER HOLE
- PR 81-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 5 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

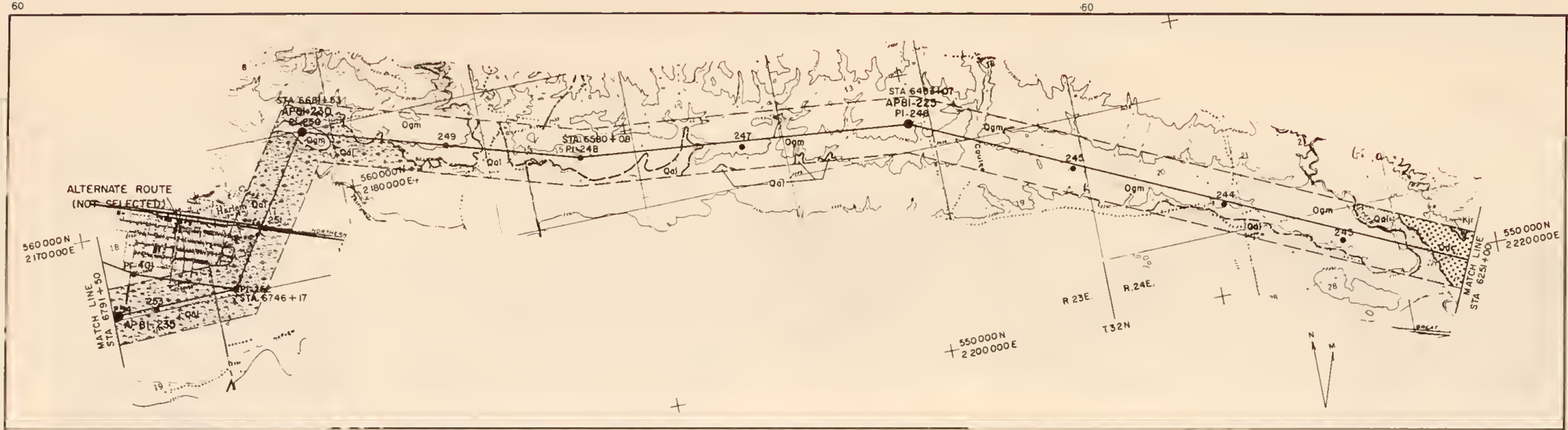
NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 5209+00 TO STATION 6251+00

GEOLOGY V. BERDI	REVIEWED A. STILLEY	
DRAWN M. Hamilton	APPROVED Gary A. O'Dell Vice Pres. N.T.L.	
CHECKED A. STILLEY		
DECEMBER 1981	FP — HV	8006



LEGEND

GEOLOGIC UNITS

QUATERNARY

- Qal — QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
- Qgm — QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
- Qgc — QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL. GENERALLY SHALLOW BEDROCK.

TERTIARY

- Ty — TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES

UPPER CRETACEOUS

- Kb — BEARPAW SHALE - SEMI CONSOLIDATED CLAYSTONE SHALE WEATHERING TO CLAY GUMBO
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OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP 81-100 — AUGER HOLE
- PR 81-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 3 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

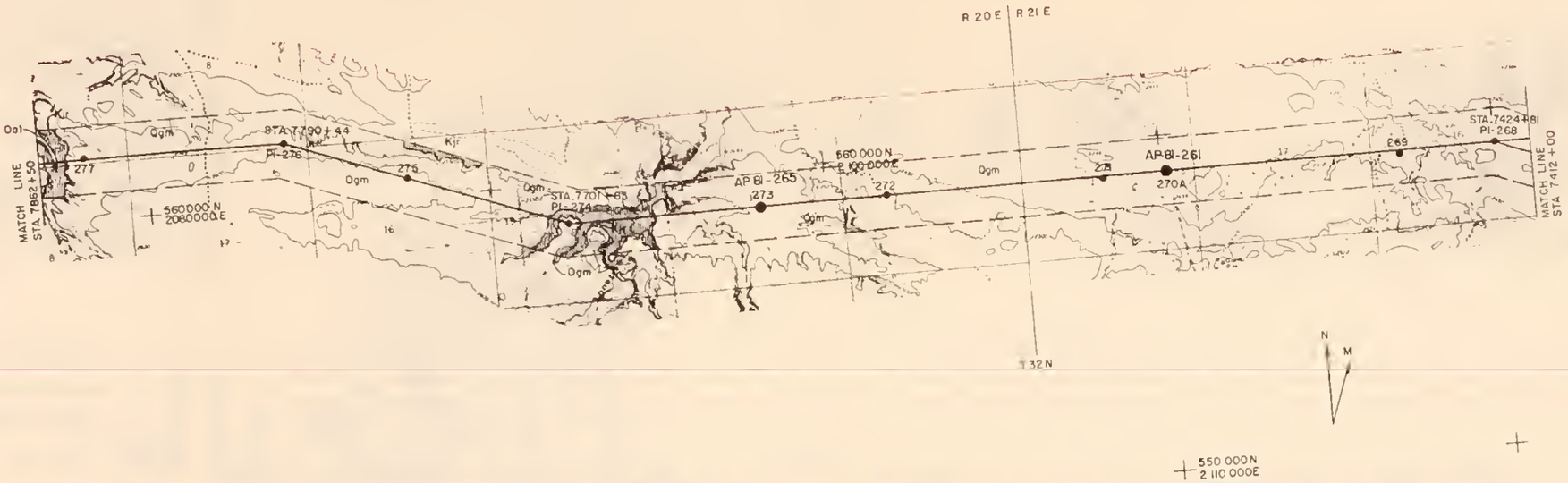
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 6251+00 TO STATION 7412+00

GEOLOGY V. REED	REVIEWED A. STILLEY
DRAWN D. J. BEITZ	APPROVED [signature] Vice Pres. N.T.L.
CHECKED A. STILLEY	

DECEMBER 1981 | FP — HV | 8007



LEGEND

GEOLOGIC UNITS

QUATERNARY

- Qal — QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
- Qgm — QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
- Qac — QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL GENERALLY SHALLOW BEDROCK.

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- Tv — TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES

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- ROUTE OF PROPOSED TRANSMISSION LINE
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- 3 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK — HAVRE
230 KV TRANSMISSION LINE
MONTANA

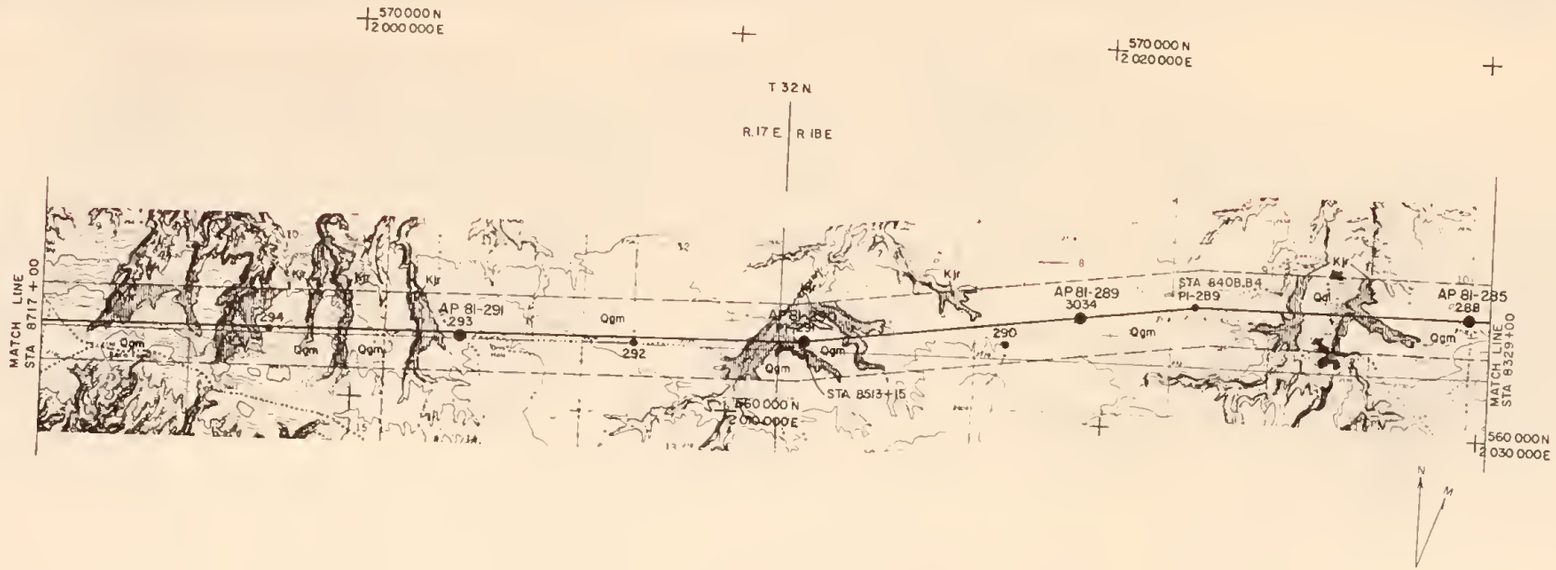
GEOLOGIC & EXPLORATIONS LOCATION MAP

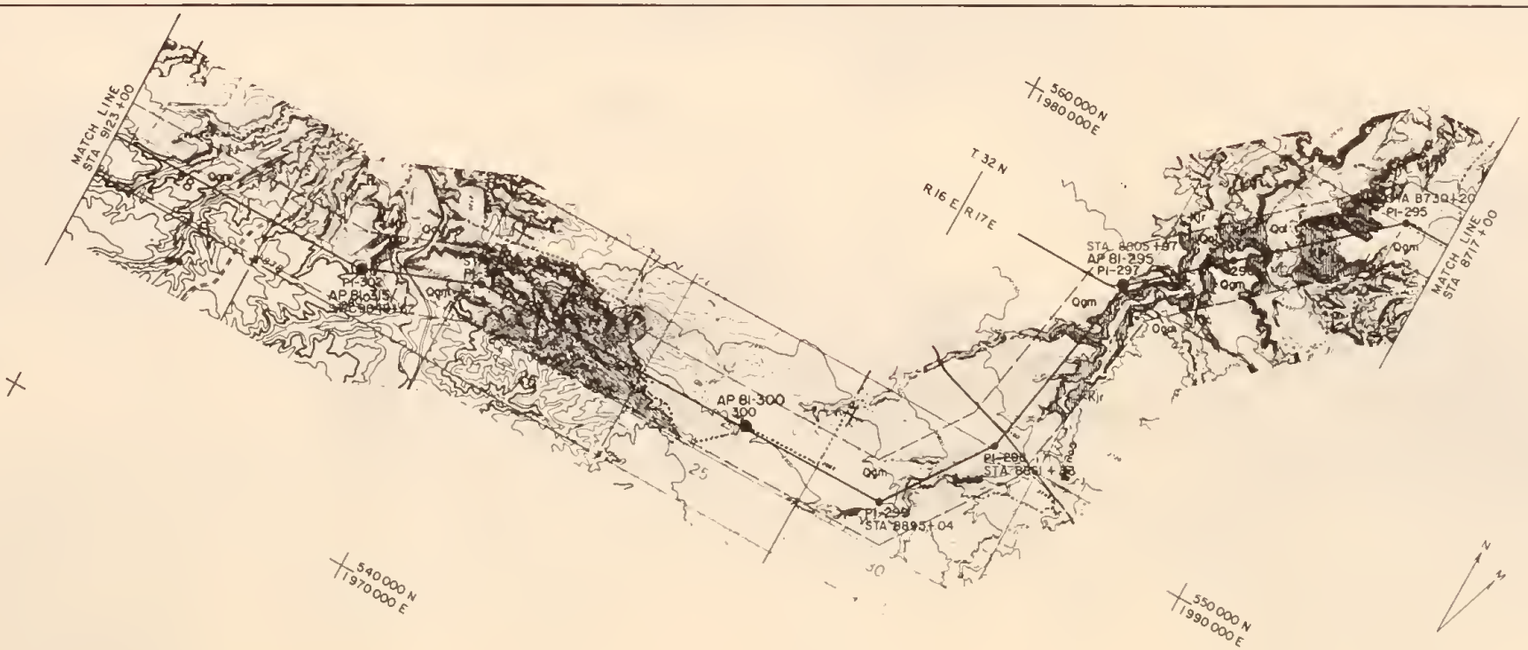
STATION 7412+00 TO STATION 8329+00

GEOLOGY V. DEDL
DRAWN D.J. BEIK
CHECKED A. STILLEY
REVIEWED A. STILLEY
APPROVED Lloyd H. O'Dell, Vice Pres NTL

DECEMBER 1981 | FP — HV | 8008

62





LEGEND

GEOLOGIC UNITS

QUATERNARY

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OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP 81-100 — AUGER HOLE
- PR 81-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 5 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 — 2000 — 4000 FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

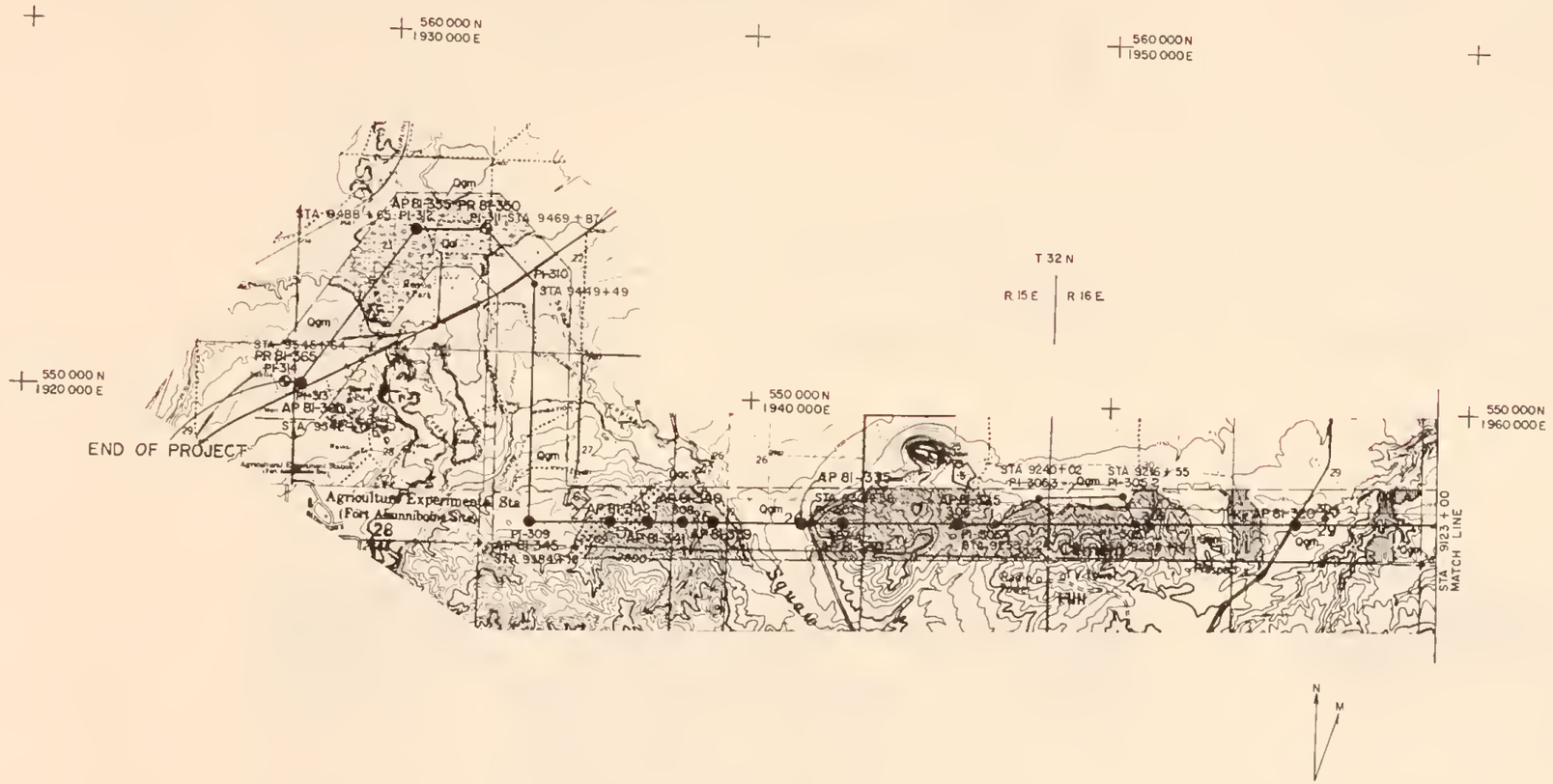
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK – HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 8329+00 TO STATION 9123+00

GEOLOGY V. BEDI
DRAWN M. GRUNENFELDER
CHECKED A. STILLEY
REVIEWED A. STILLEY
APPROVED Larry K. Odell Vice Pres. N.T.L.

DECEMBER 1981 | FP – HV | 8009



LEGEND

GEOLOGIC UNITS

QUATERNARY

- Qal — QUATERNARY ALLUVIUM - INTERBEDDED CLAY, SILT, SAND AND GRAVELS
- Qgm — QUATERNARY GLACIAL MORAINE - CLAY TILL INCLUDING LENSES OF SAND AND GRAVEL
- Qal / Qgm — QUATERNARY ALLUVIAL - COLLUVIAL DEPOSITS - CLAYS WITH SAND AND GRAVEL GENERALLY SHALLOW BEDROCK

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- Tv — TERTIARY VOLCANICS - FLOWS AND FLOW BRECCIAS, BASALTS, ANDESITES

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OTHER SYMBOLS

- LIMIT OF GEOLOGIC MAPPING
- ROUTE OF PROPOSED TRANSMISSION LINE
- AP BI-100 — AUGER HOLE
- PR BI-100 — PENETRATION RESISTANCE HOLE
- 150 — CONTROL POINT ESTABLISHED BY SURVEYORS
- Kb / Kjr — INFERRED GEOLOGIC CONTACT
- 5 — PHOTO NUMBER AND DIRECTION OF VIEW
- MARSHY CONDITIONS - POSSIBLE HIGH GROUND WATER

SCALE

0 2000 4000
FEET

DATUM USGS 7½' AND 15' TOPOGRAPHIC AND ORTHOGRAPHIC QUADRANGLES

NORTHERN TESTING LABORATORIES INC.
BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - GOLDEN, COLORADO

FORT PECK – HAVRE
230 KV TRANSMISSION LINE
MONTANA

GEOLOGIC & EXPLORATIONS LOCATION MAP
STATION 9123+00 TO STATION 9545+64

GEOLOGY V. DEPI	REVIEWED A. STILLEY	
DRAWN M. GRUNENFELDER	APPROVED [signature] Vice Pres N.T.L.	
CHECKED A. STILLEY		
DECEMBER 1981	FP – HV	8010

WAPA F 6400.4
(Formerly WAPA 182-1)

64

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-5

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 93+60 — Coordinates N 379,803 E 2,747,869 — Ground Elevation 2203 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/28/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
ML		0.5	5. Sack	7	0.0' - 0.5' TOPSOIL - about 15% fine sand, 75% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture moist, firm.			
		5.0	5. Sack	10	0.5' - 5.0' CLAYEY SILT - about 5% fine to coarse gravel, 10% sand, 85% low plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, glacial till (ML).		0	0
CL			5. Sack	13	5.0' - 15.0' SANDY CLAY - about 8% predominantly fine gravel, 30% sand, 62% medium plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, glacial till (CL).		0	0
		15.0			LL % 34 — PI % 18 — Gravel % 8 — Sand % 30 — Fines % 62			

REMARKS After Auger Removed, Hole Sloughed at 12 feet
Hole Backfilled 6/28/81
Required Depth = 15.0 feet
Drilled 40 feet south of PI-103

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-5 — DWG NO FP-HV 8011

WAPA F 6400.4
(Formerly WAPA 182-1)

65

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-10

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 216+34 — Coordinates N 379,338 E 2,735,604 — Ground Elevation 2339 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/28/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5	SPT N = 64	B	0.0' - 0.5' TOPSOIL - about 10% sand, 30% medium plasticity fines, 60% organic material, Maximum Size fine sand, Color brown, Moisture moist, firm.			
CL			SPT N = 69	B	0.5' - 14.4' SILTY CLAY - about 5% gravel, 10% predominantly fine sand, 85% medium plasticity fines, Maximum Size 3/4", Color brown, Moisture moist, hard, glacial till (CL).		0	0
		14.4	SPT N = 51	14				

REMARKS After Auger Removed, Hole Sloughed at 11.8 feet
Hole Backfilled 6/28/81
Limit of Auger = 14.4 feet
Drilled at PI-106

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-10 — DWG NO FP-HV 8012

WAPA F 6400.4
(Formerly WAPA 182-1)

66

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-15

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 321+30 — Coordinates N 379,061 E 2,725,115 — Ground Elevation 2342 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/29/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 10% gravel, 10% fine sand, 40% medium plasticity fines, 40% organic material, Maximum Size 6", Color Brown, Moisture moist, stiff		3	2
			SPT N=19	B				
CL					0.4' - 14.5' SILTY CLAY - about 5% fine gravel, 20% sand, 75% low plasticity fines, Maximum Size fine gravel, Color Brown, Moisture slightly moist, very stiff to hard, shale fragments, glacial till (CL)		0	0
			SPT N=39	10				
		14.5	SPT N=37	10				

REMARKS After auger removed, hole remained open
Hole backfilled 10/29/81
Limit of Augers = 14.5 feet
Drilled 15 feet northwest of P1325

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-15 — DWG NO FP-HV 8013

WAPA F 6400.4
(Formerly WAPA 182-1)

67

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-16

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 415+00 — Coordinates N 380,680 E 2,715,791 — Ground Elevation 2372 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/29/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.3' TOPSOIL - about 10% gravel, 50% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		3	2
			SPT N=18	4				
SW					0.3' - 11.0' GRAVELLY SAND - about 5% cobbles and boulders, 20% gravel, 50% sand, 25% low plasticity fines, Maximum Size 6", Color Brown, Moisture slightly moist, medium dense, glacial till (SW).		3	2
			SPT N=24	6				
		11.0			11.0' - 14.5' CLAYSTONE SHALE - about 5% fine sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.		0	0
		14.5	SPT N=50	23				

REMARKS After auger removed, hole caved at 8 feet.
Hole backfilled 10/29/81
Limit of Augers = 14.5 feet
Drilled 18 feet northeast of control point 327

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-16 — DWG NO FP-HV 8014

WAPA Form 6
(formerly WAPA 182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-19

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 618+00 — Coordinates N 385,899 E 2,697,587 — Ground Elevation 2182 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile 8-50 — Date 10/29/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 20% gravel, 10% sand, 30% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		3	2
CL			SPT N=37	13				
		5.0			0.4' - 5.0' SILTY CLAY - about 10% gravel, 15% sand, 75% medium plasticity fines, Maximum Size 2", Color Brown, Moisture slightly moist, hard, glacial till (CL).		0	0
			SPT N=47	20				
					5.0' - 14.5' CLAYSTONE SHALE - about 10% fine sand, 90% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.		0	0
			SPT N=60	21				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/29/81
Limit of Augers = 14.5 feet
Drilled 22 feet north of control point 331

Moderately Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-19 | DWG NO FP-HV 8015

WAPA Form 6
(formerly WAPA 182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-20

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 668+00 — Coordinates N 389,682 E 2,694,053 — Ground Elevation 2168 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile 8-50 — Date 10/29/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 10% gravel, 10% sand, 40% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 6", Color Brown, Moisture moist, stiff.		3	2
			SPT N=49	8				
CL					0.4' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 20% predominantly fine sand, 70% low plasticity fines, Maximum Size 6", Color Brown, Moisture slightly moist, hard to very stiff, glacial till (CL)		3	2
			SPT N=62	10				
			SPT N=28	10				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled, 10/29/81
Limit of Augers = 14.5 feet
Drilled 3 feet east of control point 332

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-20 | DWG NO FP-HV-8016

WAPA Form 6400-1
(formerly WAPA 182)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-25

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 911+00 — Coordinates N 406,769 E 2,676,862 — Ground Elevation 2426 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile 8-50 — Date 10/28/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.3' TOPSOIL about 25% gravel, 20% sand, 20% low plasticity fines, 35% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, medium dense.		3	2
GW			SPT N=47	1				
		6.0			0.3' - 6.0' SANDY GRAVEL WITH COBBLES AND BOULDERS - about 50% rounded gravel, 30% sand, 20% non to low plasticity fines, Maximum Size 12", Color Brown, Moisture slightly moist, dense, (glacial till) (GW).		7	3
CL			SPT N=49	10				
		10.0			6.0' - 10.0' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 15% sand, 75% low plasticity fines, Maximum Size 6", Color Brown, Moisture slightly moist, hard, glacial till (CL).		4	1
			SPT N=30	17				
		14.5			10.0' - 14.5' CLAYSTONE SHALE - about 10% sand, 90% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, hard, blocky, oxides, weathered, Bearpaw shale.		0	0

REMARKS
After auger removed, hole caved at 6 feet.
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 15 feet southeast of control point 337

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-25 | DWG NO FP-HV 8017

WAPA Form 6400-1
(formerly WAPA 182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-30

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 1023+00 — Coordinates N 415,928 E 2,670,335 — Ground Elevation 2400 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile 8-50 — Date 10/28/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.3' TOPSOIL - about 15% gravel, 5% sand, 40% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		3	2
			SPT N=22	18				
					0.3' - 14.5' CLAYSTONE SHALE - about 5% fine sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Dark Gray, Moisture moist, very stiff to hard, blocky, oxides, weathered near surface, Bearpaw shale.		0	0
			SPT N=41	24				
			SPT N=40	26				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 8 feet east of control point 339

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-30 | DWG NO FP-HV 8018

WAPA F 6400 c
(formerly WAPA 182-5)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-3S

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 1124+50 — Coordinates N 423,739 E 2,663,997 — Ground Elevation: 2329 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile 8-50 — Date: 10/28/81 — Logged By: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 20% gravel, 10% sand, 30% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		S	S
			SPT N=54	12				
CL					0.4' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 20% sand, 65% low to medium plasticity fines, Maximum Size 6", Color Brown, Moisture slightly moist to moist, hard to very stiff, sand lenses, glacial till (CL)		3	2
			SPT N=26	17				
			SPT N=29	11				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled one foot west of control point 341

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-3S — DWG NO FP-HV 8019

WAPA F 6400 c
(formerly WAPA 182-5)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-40

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 1237+50 — Coordinates N 432,938 E 2,658,904 — Ground Elevation: 2293 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile 8-50 — Date: 10/28/81 — Logged By: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 20% gravel, 20% sand, 20% low plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		7	3
			SPT N=45	9				
CL					0.4' - 12.0' SILTY CLAY - about 5% gravel, 10% sand, 85% low to medium plasticity fines, Maximum Size 1", Color Gray, Moisture slightly moist, hard, glacial till (CL)		0	0
			SPT N=51	11				
		12.0			12.0' - 14.5' CLAYSTONE SHALE - about 5% fine sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color dark gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.			
			SPT N=68	18				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled one foot south of control point 344

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-40 — DWG NO FP-HV 8020

WAPA F 6400 c
(formerly WAPA 182-7)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-4S

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 1332+30 — Coordinates N 442,368 E 2,658,531 — Ground Elevation: 2203 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile 8-50 — Date: 10/28/81 — Logged By: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.3' TOPSOIL - about 20% gravel, 10% sand, 30% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		7	3
			SPT N=31	7				
CL					0.3' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 20% sand, 65% low plasticity fines, Maximum Size 12", Color Brown, Moisture slightly moist, hard, glacial till (CL).		3	2
			SPT N=59	12				
			SPT N=58	10				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 7 feet north of PI 346

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-4S — DWG NO FP-HV 8021

WAPA F 6400 c
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-5O

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 1384+00 — Coordinates N 448,062 E 2,658,177 — Ground Elevation: 2271 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile 8-50 — Date: 10/28/81 — Logged By: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 20% gravel, 20% sand, 30% medium plasticity fines, 30% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		7	3
			SPT N=24	8				
CL					0.4' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 20% sand, 70% low to medium plasticity fines, Maximum Size 6", Color Brown, Moisture slightly moist, very stiff to hard, salts, glacial till (CL)		7	3
			SPT N=52	10				
			SPT N=47	13				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 12 feet east of control point 347

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-5O — DWG NO FP-HV 8022

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-55 — Coordinates N: 458,817 — E: 2,658,574 — Ground Elevation: 2155

Depth and Elev of Water Level*: Not Encountered — Location: 6' south of PI-350 — Station: 1502+73 — Total Depth: 24.5 feet

*Date Measured: 10 27 81 — Date Begun: 10/27/81 — Finished: 10/27/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES: Water losses, type and size of hole, drilling method and conditions, Caving and other information	CORE RECOVERY-%	BLOWS FOOT	WATER CONTENT-%	SAMPLES FOR TESTING	DEPTH (FT.)	GRAPHIC LOG	PENETRATION RESISTANCE Blows per Foot (Weight of Hammer 140 lb., Height of Drop 30 in.)	CLASSIFICATION AND DESCRIPTION OF MATERIAL
Drill Equipment: Mobile B-50 Rotary, Truck-mounted	100	25	3	SPT	0.3	SM	•	0.0'-0.3' TOPSOIL - about 20% sand, 40% low to medium plasticity fines, 40% organic material, Maximum Size fine sand, Color Brown, Moisture moist, stiff.
Driller: B. Neff	100	38	9	SPT	0.6		•	0.3'-6.0' SILTY SAND - about 68% medium to fine sand, 32% non-plastic fines, Maximum Size medium sand, Color Brown, Moisture slightly moist, medium dense, glacial till (SM).
Method: Drilled with 9" diameter hollow-stem augers. Drive Sample (SPT) taken at the intervals listed below	100	38	16	SPT	10		•	
	65	50/0.3	1*	SPT	17.5	CL		100
	100	60	21	SPT	20			
					22.0	GW		60
					24.5			

LL / PI / Gravel / Sand / Fines (%)

Granular Non-Plastic: 0 / 68 / 32

6.0'-17.5' SILTY CLAY - about 5% gravel, 20% sand, 75% low plasticity fines, Maximum Size 2", Color Brown, Moisture slightly moist to moist, hard, glacial till (CL).

17.5'-22.0' SANDY GRAVEL - about 60% gravel, 30% sand, 10% low plasticity fines, Maximum Size 4", Color Brown, Moisture slightly moist, very dense, rounded to subround, glacial till (GW).

22.0'-24.5' CLAYSTONE SHALE - about 5% sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Oark Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.

Drive Sample Intervals, Feet:
3.0 - 4.5
8.0 - 9.5
3.0 - 14.5
18.0 - 19.0
23.0 - 24.5

Progress Report
0 - 24.5' 10/27/81
After auger removed, hole caved to 18 feet. Moderate to difficult drilling.

Hole Backfilled
10/27/81

*Moisture content not representative

EXPLANATION

BLOWS FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows foot.

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size 1.4 inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○

FEATURE Fort Peck-Havre 230 KV Transmission Line — STATE Montana — HOLE NO. PR 81-55 — DWG NO. FP-HV 8023

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-60 — Coordinates N: 458,912 — E: 2,658,566 — Ground Elevation: 2155

Depth and Elev of Water Level*: Not Encountered — Location: 6' west of PI-351 — Station: 1508+63 — Total Depth: 24.5 feet

*Date Measured: 10/27/81 — Date Begun: 10/27/81 — Finished: 10/27/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES: Water losses, type and size of hole, drilling method and conditions, Caving and other information	CORE RECOVERY-%	BLOWS FOOT	WATER CONTENT-%	SAMPLES FOR TESTING	DEPTH (FT.)	GRAPHIC LOG	PENETRATION RESISTANCE Blows per Foot (Weight of Hammer 140 lb., Height of Drop 30 in.)	CLASSIFICATION AND DESCRIPTION OF MATERIAL
Drill Equipment: Mobile B-50 Rotary, Truck-mounted	100	29	4	SPT	0.3	SM	•	0.0'-0.3' TOPSOIL - about 20% sand, 40% low plasticity fines, 40% organic material, Maximum Size fine sand, Color Brown, Moisture moist, stiff.
Driller: B. Neff	85	40	11	SPT	6.0		•	0.3'-6.0' SILTY SAND - about 5% gravel, 70% predominantly fine sand, 25% low plasticity fines, Maximum Size 1", Color Brown, Moisture slightly moist, medium dense, glacial till (SM).
Method: Drilled with 9" diameter hollow-stem augers. Drive Samples (SPT) taken at intervals listed below	100	29	13	SPT	10		•	
	0	95/0.9	-	SPT	17.0	CL		105
	100	59	24	SPT	20			
					21	GW		59
					24.5			

LL / PI / Gravel / Sand / Fines (%)

44 / 24 / 7 / 16 / 77

6.0'-17.0' SILTY CLAY - about 7% gravel, 16% sand, 77% medium plasticity fines, Maximum Size 1", Color Brown, Moisture slightly moist, hard to very stiff, re-worked glacial till (CL).

17.0'-21.0' SANDY GRAVEL - about 50% gravel, 40% sand, 10% non-plastic fines, Maximum Size 4", Color Brown, Moisture slightly moist, very rounded to subrounded, glacial till (GW).

21.0'-24.5' CLAYSTONE SHALE - about 5% sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Oark Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.

Drive Sample Intervals, Feet:
3.0 - 4.5
8.0 - 9.5
13.0 - 14.5
18.0 - 19.4
23.0 - 24.5

Progress Report
0-24.5' 10/27/81
After auger removed, hole caved to 20 feet. Moderately difficult drilling.

Hole Backfilled:
10/27/81

EXPLANATION

BLOWS FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows foot.

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size 1.4 inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○

FEATURE Fort Peck-Havre 230 KV Transmission Line — STATE Montana — HOLE NO. PR 81-60 — DWG NO. FP-HV 8024

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-65 — Coordinates N: 458,868 — E: 2,658,609 — Ground Elevation: 2155

Depth and Elev of Water Level*: Not Encountered — Location: 45' north and 45' east of PI-350 — Station: 1508+18 — Total Depth: 24.5 feet

*Date Measured: 10/28/81 — Date Begun: 10/28/81 — Finished: 10/28/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES: Water losses, type and size of hole, drilling method and conditions, Caving and other information	CORE RECOVERY-%	BLOWS FOOT	WATER CONTENT-%	SAMPLES FOR TESTING	DEPTH (FT.)	GRAPHIC LOG	PENETRATION RESISTANCE Blows per Foot (Weight of Hammer 140 lb., Height of Drop 30 in.)	CLASSIFICATION AND DESCRIPTION OF MATERIAL
Drill Equipment: Mobile B-50 Rotary, Truck-mounted	100	55	12	SPT	0.3		55	0.0'-0.3' TOPSOIL - about 30% sand, 30% medium plasticity fines, 40% organic material, Maximum Size fine sand, Color Brown, Moisture moist, stiff.
Driller: B. Neff	100	55	9	SPT	10	CL	55	0.3'-17.5' SILTY CLAY WITH BOULDERS - about 15% gravel, 20% sand, 65% low to medium plasticity fines, Maximum Size 24", Color Brown, Moisture slightly moist to moist, hard, glacial till (CL).
Method: Drilled with 9" diameter hollow-stem augers. Drive Samples (SPT) taken at the intervals listed below.	100	63	16	SPT			63	
	60	50/0.4	6	SPT	17.5	GW	125	
	100	81	24	SPT	20		81	17.5'-20.0' SANDY GRAVEL - about 60% gravel, 30% sand, 10% low plasticity fines, Maximum Size 2", Color Brown, Moisture slightly moist, very dense, rounded, glacial till (GW).
					24.5			20.0-24.5' CLAYSTONE SHALE - about 5% fine sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.

Drive Sample Intervals, Feet:
3.0 - 4.5
8.0 - 9.5
13.0 - 14.5
18.0 - 18.4
23.0 - 24.5

Progress Report
0-24.5' 10/28/81
Auger refusal on boulders at 10 feet. Moved 3 feet east and redrilled. After auger removed hole caved to 20.5 feet. Moderately difficult drilling.

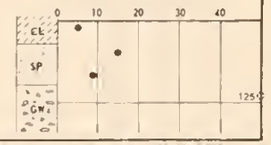
Hole Backfilled:
10/28/81

EXPLANATION

BLOWS FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows foot.

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size 1.4 inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○



FEATURE Fort Peck-Havre 230 KV Transmission Line — STATE Montana — HOLE NO. PR 81-65 — DWG NO. FP-HV 8025

WAPA P 6400 4
(formerly WAPA 182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-70

Feature: Fort Peck - Havre 230 KV Transmission Line
State: Montana
Station: 1496+76
Coordinates N 458,767 E 2,657,479 Ground Elevation 2129 Approx. Dimensions 9" Auger
Date & Depth to Water: Not Encountered Method of Excavation: Mobile B-50 Date: 10/28/81 Logged by: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION." GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.2' TOPSOIL - about 10% sand, 70% medium plasticity fines, 20% organic material, Maximum Size medium sand, Color Brown, Moisture moist, stiff		0	0
CL			SPT N=81	17	0.3' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 20% sand, 70% low to medium plasticity fines, Maximum Size 6", Color gray brown, Moisture moist, hard, reworked glacial till (CL)		3	2
			SPT N=56	17				
		14.5	SPT N=64	15				

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 5 feet south of PI-349

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-70 DWG NO FP-HV 8026

WAPA P 6400 4
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-75

Feature: Fort Peck - Havre 230 KV Transmission Line
State: Montana
Station: 1587+00
Coordinates N 458,841 E 2,650,770 Ground Elevation 2210 Approx. Dimensions 9" Auger
Date & Depth to Water: Not Encountered Method of Excavation: Mobile B-50 Date: 10/28/81 Logged by: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION." GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.4 TOPSOIL - about 5% gravel, 20% sand, 40% medium plasticity fines, 35% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		3	2
			SPT N=27	8				
CL					0.4' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 20% sand, 65% low plasticity fines, Maximum Size 8", Color Brown, Moisture slightly moist, very stiff to hard, glacial till (CL).		6	4
			SPT N=49	8				
		14.5	SPT N=41	13				

REMARKS
After auger removed, hole remained open
Hole backfilled 10/28/81
Limit of Augers = 14.5 feet
Drilled 10 feet east of control point 3S3

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-75 DWG NO FP-HV 8027

WAPA P 6400 4
(formerly WAPA 182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-80

Feature: Fort Peck - Havre 230 KV Transmission Line
State: Montana
Station:
Coordinates N 453,838 E 2,659,829 Ground Elevation 2203 Approx. Dimensions 9" Auger
Date & Depth to Water: Not Encountered Method of Excavation: Mobile B-50 Date: 6/27/81 Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION." GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.2			0.0' - 0.2' TOPSOIL - about 40% predominantly coarse gravel, 20% sand, 20% non-plastic fines, 20% organic material, Maximum Size 3", subrounded, Color brown, Moisture dry.			
CL			SPT N = 38	10	0.2' - 7.8' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 10% predominantly fine sand, 80% medium plasticity fines, Maximum Size 7", Color dark brown, Moisture moist, hard, glacial till (CL).		5	5
		7.8	SPT N = 48	26	7.8' - 14.2' CLAYSTONE SHALE - about 2% fine sand, 98% high plasticity fines, Color dark gray, Moisture hard, blocky.		5	0
		14.2	SPT N = 63	23				

LL %	PI %	Gravel %	Sand %	Fines %
69	32	0	2	98

REMARKS After Auger Removed, Hole Sloughed to 11.8 feet
Hole Backfilled 6/27/81
Limit of Auger = 14.2 feet
Drilled at PI-139

Moderate to Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-80 DWG NO FP-HV 8028

WAPA P 6400 4
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-85

Feature: Fort Peck - Havre 230 KV Transmission Line
State: Montana
Station:
Coordinates N 459,764 E 2,640,013 Ground Elevation 2166 Approx. Dimensions 22" Auger
Date & Depth to Water: Not Encountered Method of Excavation: Power Pole Auger Date: 6/27/81 Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION." GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CH		0.5			0.0' - 0.5' TOPSOIL - about 20% sand, 70% medium plasticity fines, 10% organic material Maximum Size fine sand, Color brown, Moisture - moist, firm.			
		2.0						
SC			5. 5ack	9	0.5' - 2.0' FAT CLAY - about 10% fine sand, 90% high plasticity fines, Maximum Size fine sand, Color gray, Moisture moist, hard, alluvial (CH).		0	0
					2.0' - 15.0' CLAYEY SAND - poorly graded, about 60% fine sand, 40% low plasticity fines, Maximum Size fine sand, Color brown, Moisture moist, medium dense, alluvial (SC).		0	0
			5. 5ack	12				
		15.0						

REMARKS After Auger Removed, Hole Sloughed at 13 feet
Hole Backfilled 6/27/81
Required Depth = 15.0 feet
Drilled at Control Point 143

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-85 DWG NO FP-HV 8029

WAPA 8400 s
(formerly WAPA-102-1)

83

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-90

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 1844+11 — Coordinates N 463,001 E 2,629,162 — Ground Elevation 2278 — Approx Dimensions 9" Auger
Data & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/27/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.3	SPT N = 22	8	D.0' - 0.3' TOPSOIL - about 10% sand, 50% low plasticity fines, 40% organic material, Maximum Size medium sand, Color brown, Moisture dry, firm.			
			SPT N = 62	10	0.3' - 14.5' SILTY CLAY WITM COBBLES AND BOULDERS - about 5% gravel, 10% fine sand, 85% low to medium plasticity fines, Maximum Size 8", Color brown, Moisture moist, hard, glacial till (CL).		3	2
		14.5	SPT N = 42	13				

REMARKS
After Auger Removed, Mole Sloughed to 11.7 feet
Hole Backfilled 6/27/81
Limit of Auger = 14.5 feet
Drilled at PI-14S

Moderate to Oifficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-90 — DWG NO FP-HV 803D

WAPA 8400 s
(formerly WAPA-102-1)

84

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-9S

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 2082+11 — Coordinates N 469,240 E 2,606,200 — Ground Elevation 2437 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/27/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.S	S. Sack	11	D.0' - 0.S' TOPSOIL - about 20% sand, 70% low plasticity fines, 10% organic material, Maximum Size medium sand, Color brown, Moisture dry, firm.			
		S.S	S. Sack		D.S' - S.S' SILTY CLAY - about 2% gravel, 22% predominantly medium to fine sand, 76% medium plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard (CL).		D	0
		6.5	S. Sack	20				
			S. Sack	21				
		1S.0			S.S' - 6.S' SANDSTONE - about 90% fine sand, 10% non-plastic fine, Maximum Size fine sand, Color light tan, Moisture dry, well cemented, cap rock, very dense.		0	D
					6.S' - 1S.0' CLAYSTONE SHALE - about S% sand, 9S% high plasticity fines, Maximum Size fine sand, Color dark gray, Moisture moist, hard, Bearpaw Shale.		0	0

LL %	PI %	Gravel %	Sand %	Fines %
47	24	2	22	76

REMARKS
After Auger Removed, Hole Sloughed to 12 feet
Hole Backfilled 6/27/81
Required Oepth = 1S.0 feet
Drilled 1S feet east of PI-1SD

Moderately Hard Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-9S — DWG NO FP-HV 803I

WAPA 8400 s
(formerly WAPA-102-1)

85

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-100

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 2231+92 — Coordinates N 475,635 E 2,592,306 — Ground Elevation 2416 — Approx Dimensions 9" Auger
Data & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/27/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.3	SPT N = 44	7	D.0' - 0.3' TOPSOIL - about 5% fine gravel, 10% sand, 50% low plasticity fines, 35% organic material, Maximum Size 1/2", Color brown, Moisture dry, firm.			
			SPT N = 45	12	0.3' - 14.4' SILTY CLAY - about 5% fine gravel, 10% sand, 85% low to medium plasticity fines, Maximum Size 3/4", Color brown, Moisture moist, hard, glacial till (CL).		0	0
		14.4	SPT N = 34	13				

REMARKS
After Auger Removed, Hole Sloughed to 11.8 feet
Mole Backfilled 6/27/81
Limit of Auger = 14.4 feet
Orilled 15 feet north of Control Point 1S3

Moderate to Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-1D0 — DWG NO FP-HV 8032

WAPA 8400 s
(formerly WAPA 102-1)

86

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-105

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 2406+21 — Coordinates N 478,637 E 2,576,043 — Ground Elevation 2604 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/27/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.S	S. Sack	13	0.0' - 0.S' TOPSOIL - about 60% fine sand, 30% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, loose.			
			S. Sack	10	0.S' - 9.0' SANDY CLAY WITH COBBLES AND BOULOERS - about 15% fine to coarse gravel, 15% predominantly fine sand, 70% low to medium plasticity fines, Maximum Size 8", Color brown, Moisture moist, hard, glacial till (CL). Auger refusal at 9.0 feet due to boulders.		S	3
		9.0						

REMARKS
After Auger Removed, Hole Stood Open
Hole Backfilled 6/27/81
Bottom of Mole = 9.0 feet (Auger Refusal)
Orilled 10 feet south of Control Point 1S7

Very Oifficult Drilling due to scattered cobbles and boulders

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-1DS — DWG NO FP-HV 8033

WAPA F 6400 A
(Formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-110

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 2527+16 — Coordinates N 478,335 E 2,563,962 — Ground Elevation 2678 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/27/81 — Logged by K. Barnes

Unified Soil Classification Symbol Letter	Graphic	Depth (Feet)	Size and Type of Sample Taken	In Place Moisture (%)	Classification and Description of Material (See Chart—"Unified Soil Classification" Give Geologic and In Place Description for Foundation Investigations)	Percent Moisture	Percentage by Volume of 3-5 Inch	Percentage by Volume of Plus 5-Inch
SM		0.2	SPT N=2570.0		0.0' - 0.2' TOPSOIL - about 5% fine gravel, 35% fine sand, 30% non-plastic fines, 30% organic material, Maximum Size 1/2", Color brown, Moisture dry.			
		2.7			0.2' - 2.7' SILTY SAND - poorly graded, about 60% fine sand, 40% non-plastic fines, Maximum Size fine sand, subangular, Color brown, Moisture moist, medium dense (SM).		0	0
		3.5			2.7' - 3.5' SANDSTONE - about 70% fine to medium sand, 30% non-plastic fines, Maximum Size medium sand, Color brown to gray, Moisture dry, well cemented, very dense, cap rock.		0	0

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/27/81
Bottom of Hole = 3.5 feet (Auger Refusal)
Drilled 15 feet south of PI-160

Very Difficult Drilling below 2.7 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-110 — DWG NO FP-HV 8034

WAPA F 6400 A
(Formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-11S

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 3500' north of 2755 — Coordinates N 478,089 E 2,541,184 — Ground Elevation 2267 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/27/81 — Logged by W. Henning

Unified Soil Classification Symbol Letter	Graphic	Depth (Feet)	Size and Type of Sample Taken	In Place Moisture (%)	Classification and Description of Material (See Chart—"Unified Soil Classification" Give Geologic and In Place Description for Foundation Investigations)	Percent Moisture	Percentage by Volume of 3-5 Inch	Percentage by Volume of Plus 5-Inch
SM		0.5	S. Sack	6	0.0' - 0.5' TOPSOIL - about 70% fine sand, 20% low plasticity fines, 10% organic material, Maximum Size fine sand, Color light brown, Moisture dry, loose.			
			S. Sack	5	0.5' - 15.0' SILTY SAND - poorly graded, about 2% gravel, 69% predominantly medium to fine sand, 29% non-plastic fines, Maximum Size 2", subangular, Color brown, Moisture moist, medium dense (SM).		0	0
			S. Sack	8	LL % / PI % / Gravel % / Sand % / Fines %: Granular Non-Plastic — 2 / 69 / 29			
		15.0						

REMARKS After Auger Removed, Hole Sloughed to 13 feet
Hole Backfilled 6/27/81
Required Depth = 15.0 feet
Drilled 20 feet south of Control Point 2041

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-11S — DWG NO FP-HV 8035

WAPA F 6400 A
(Formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-120

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 2868+50 — Coordinates N 479,494 E 2,531,944 — Ground Elevation 2530 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/27/81 — Logged by W. Henning

Unified Soil Classification Symbol Letter	Graphic	Depth (Feet)	Size and Type of Sample Taken	In Place Moisture (%)	Classification and Description of Material (See Chart—"Unified Soil Classification" Give Geologic and In Place Description for Foundation Investigations)	Percent Moisture	Percentage by Volume of 3-5 Inch	Percentage by Volume of Plus 5-Inch
SM		0.5	S. Sack	6	0.0' - 0.5' TOPSOIL - about 40% fine sand, 50% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, loose.			
		5.0	S. Sack	10	0.5' - 5.0' SILTY SAND - poorly graded, about 80% fine sand, 20% non-plastic fines, Maximum Size fine sand, subangular, Color brown, Moisture moist, medium dense (SM).		0	0
		15.0	S. Sack	10	5.0' - 15.0' SANDSTONE - about 70% fine sand, 30% non-plastic fines, Maximum Size fine sand, Color brown, Moisture moist, dense, weak to moderate cementation, Judith River Sandstone.		0	0

REMARKS After Auger Removed, Hole Sloughed to 13 feet
Hole Backfilled 6/27/81
Required Depth = 15.0 feet
Drilled 15 feet north of Control Point 167

Easy Drilling to 5.0 feet, Moderate Drilling 5.0 feet to 15.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated.

HOLE NO AP81-120 — DWG NO FP-HV 8036

WAPA F 6400 A
(Formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-12S

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 3024+50 — Coordinates N 484,248 E 2,517,119 — Ground Elevation 2505 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/27/81 — Logged by K. Barnes

Unified Soil Classification Symbol Letter	Graphic	Depth (Feet)	Size and Type of Sample Taken	In Place Moisture (%)	Classification and Description of Material (See Chart—"Unified Soil Classification" Give Geologic and In Place Description for Foundation Investigations)	Percent Moisture	Percentage by Volume of 3-5 Inch	Percentage by Volume of Plus 5-Inch
ML		0.1			0.0' - 0.1' TOPSOIL - about 40% fine sand, 30% non-plastic fines, 30% organic material, Maximum Size fine sand, Color light gray, Moisture dry.			
		3.0	SPT N = 31	11	0.1' - 3.0' SANDY SILT - about 30% fine sand, 70% low plasticity fines, Maximum Size fine sand, Color light gray, Moisture moist, medium dense (ML).		0	0
			SPT N=50/0.4	S	3.0' - 12.0' SILTSTONE SHALE - about 20% fine sand, 80% low plasticity fines, Maximum Size fine sand, Color gray brown, Moisture moist, hard, laminated, Judith River Formation.		0	0
		12.0	SPT					
		14.0	N=87/0.8	14	12.0' - 14.0' CLAYSTONE SHALE - about 10% fine sand, 90% medium to high plasticity fines, Maximum Size fine sand, Color dark gray, Moisture moist, hard, Judith River Formation.		0	0

REMARKS After Auger Removed, Hole Sloughed to 11.6 feet
Hole Backfilled 6/27/81
Limit of Auger = 14.0 feet
Drilled 20 feet north of Control Point 170

Moderately Hard Drilling below 3.0 feet.

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-12S — DWG NO FP-HV 8037

WAPA F 6400 4
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-130

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 3227+50 — Coordinates N 483,010 E 2,497,006 — Ground Elevation 2652 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/26/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
ML	SPT	0.5	S. Sack	7	0.0' - 0.5' TOPSOIL - about 70% fine sand, 20% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, loose.			
		3.5	S. Sack	8	0.5' - 3.5' SANDY SILT - about 4% fine gravel, 25% predominantly medium to fine sand, 71% non-plastic to low plasticity fines, Maximum Size 1/2", Color light brown, Moisture moist, medium dense (ML).		0	0
			S. Sack	11	LL % 23 — PI % 1 — Gravel % 4 — Sand % 25 — Fines % 71			
		15.0			3.5' - 15.0' SANDSTONE - about 70% fine sand, 30% non-plastic fine, Maximum Size - fine sand, Color brown, Moisture moist, dense, weak cementation, Judith River Formation.		0	0

REMARKS After Auger Removed, Hole Sloughed to 14 feet
Hole Backfilled 6/26/81
Required Depth = 15.0 feet
Drilled 10 feet north of Control Point 174

Moderately Difficult Drilling below 3.5 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-130 — DWG NO FP-HV 8038

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-135

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 3349+20 — Coordinates N 482,085 E 2,484,665 — Ground Elevation 2649 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/26/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.1	SPT N = 29	7	0.0' - 0.1' TOPSOIL - about 10% fine gravel, 10% sand, 40% low plasticity fines, 40% organic material, Maximum Size 3/4", Color brown, Moisture dry.			
			SPT		0.1' - 8.0' SANDY CLAY WITH COBBLES AND BOULDERS - about 10% coarse to fine gravel, 15% sand, 75% low plasticity fines, Maximum Size 8", Color brown, Moisture moist, hard, glacial till (CL).		4	3
		8.0	N=50/0.5	S				
		9.0			8.0' - 9.0' SANDSTONE - about 80% sand, 20% non-plastic fines, Maximum Size medium sand, Color brown to gray, Moisture dry, dense, well cemented, Judith River Formation.		0	0
			SPT N = 41	13				
		14.0			9.0' - 14.0' CLAYSTONE SHALE - about 100% medium to high plasticity fines, Color dark gray with oxide stains, Moisture moist, hard, jointed, Judith River Formation.		0	0

REMARKS After Auger Removed, Hole Caved to 9.4 feet
Hole Backfilled 6/26/81
Limit of Auger = 14.0 feet
Drilled 30 feet west of Control Point 3019

Moderate to Difficult Drilling to 8.0 feet.
Very Difficult Drilling from 8.0 to 9.0 feet.
Slow Drilling below 9.0 feet.

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-135 — DWG NO FP-HV 8039

WAPA F 6400 4
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-136

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 3524+00 — Coordinates N 481,869 E 2,468,453 — Ground Elevation 2265 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/26/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
GM		0.4			0.0' - 0.4' TOPSOIL - about 10% fine gravel, 10% sand, 60% low plasticity fines, 20% organic material, Maximum Size 3/4", Color brown, Moisture dry.			
		2.9	SPT N = 22	5	0.4' - 2.9' SILTY GRAVEL WITH COBBLES AND BOULDERS - skip-graded, about 60% coarse to fine gravel, 20% predominantly medium to fine sand, 20% low plasticity fines, Maximum Size 8", subrounded, Color brown, Moisture moist, dense, alluvial (GM).		5	3
SM			SPT N = 19	8				
					2.9' - 14.5' SILTY SAND WITH COBBLES AND BOULDERS - skip graded, about 10% coarse to fine gravel, 60% predominantly medium to fine sand, 30% non-plastic fines, Maximum Size 6", Color brown, Moisture moist, medium dense, lensed with sand and gravel, alluvial (SM).		5	2
		14.5	SPT N = 21	5				

REMARKS After Auger Removed, Hole Sloughed to 11.3 feet
Hole Backfilled 6/26/81
Limit of Auger = 14.5 feet
Drilled 14 feet south of Control Point 180

Moderate to Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-136 — DWG NO FP-HV 8040

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-137 — Coordinates N: 481,900 E: 2,465,970 — Ground Elevation: 2238

Depth and Elev of Water Level*: 17.5 — Location: 100 feet east of Beaver Creek Station 3539+50 — Total Depth: 24.5 feet

*Date Measured: 10/29/81 — Date Begun: 10/29/81 — Finished: 10/29/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES
Water losses, type and size of hole, drilling method and conditions, Caving and other information

Drill Equipment:
Mobile B-50
Rotary, Truck-mounted

Driller:
B. Neff

Method:
Drilled with 9" diameter hollow-stem augers. Drive Samples (SPT) taken at intervals listed below.

Drive Sample Intervals, feet:

3.0 - 4.5
8.0 - 9.5
13.0 - 14.5
18.0 - 19.5
23.0 - 24.5

Progress Report
0-24.5' 10/29/81
Installed 25 feet of 1½" diameter PVC pipe as observation well. After auger removed, hole remained open. Easy drilling.

Hole Backfilled:
10/29/81

Water Level:
17.5' 10/29/81

CORE RECOVERY-%	BLOWS/FOOT	WATER CONTENT-%	SAMPLES FOR TESTING	DEPTH (FT.)	GRAPHIC LOG
				0.5	
100	46	19	SPT		
100	46	23	SPT	10	CH
100	25	30	SPT		
100	15	35	SPT	20	
100	16	23	SPT	24.5	
				30	
				40	
				50	
				60	
				70	
				80	
				90	

PENETRATION RESISTANCE
Blows per Foot
Weight of Hammer: 140 lb
Height of Drop: 30 in.
0 10 20 30 40 50

CLASSIFICATION AND DESCRIPTION OF MATERIAL

0.0'-0.5' TOPSOIL - about 10% sand, 50% medium plasticity fines, 40% organic material, Maximum Size fine sand, Color Brown, Moisture moist, Firm, stiff.

0.5'-24.5' FAT CLAY - about 100% high plasticity fines, Maximum Size silt, Color Dark Brown to Gray, Moisture moist to saturated, hard to stiff, salts, oxides, alluvial (CH).

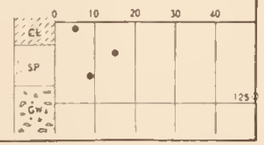
LL %	PI %	Gravel %	Sand %	Fines %
79	49	0	0	100

EXPLANATION

BLOWS FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/ 4 indicates 0 4 foot penetrated with 50 blows, extrapolated as 125 blows/foot

CLASSIFICATION AND DESCRIPTION — Describe soil type with emphasis on inplace condition Include Unified Soil Classification symbol EXAMPLE POORLY GRADED SAND 95% predominantly medium sand, 5% nonplastic fines max size f 4 inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○



FEATURE: Fort Peck-Havre 230 KV Transmission Line — STATE: Montana — HOLE NO. PR 81-137 — DWG NO. FP-HV 8041

LOG OF TEST PIT OR AUGER HOLE FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No: APB1-140

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Station: 3612+05 — Coordinates N: 481,591 E: 2,458,500 — Ground Elevation: 2246 — Approx Dimensions: 22" Auger

Date & Depth to Water: Not Encountered — Method of Excavation: Power Pole Auger — Date: 6/26/81 — Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	DENSITY	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART)—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 20% fine sand, 70% non-plastic fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry.			
SM to ML			S. Sack	4	0.5' - 15.0' SANDY SILT - about 14% gravel, 35% predominantly fine sand, 51% low plasticity fine, Maximum Size 3/4", Color brown, Moisture moist, medium, dense, alluvial (SM to ML).	0	0	0
			S. Sack	5	LL % 22 — PI % 3 — Gravel % 14 — Sand % 35 — Fines % 51			
			S. Sack	6				
		15.0						

REMARKS: After Auger Removed, Hole Stood Open
Hole Backfilled 6/26/81
Required Depth = 15.0 feet
Drilled 10 feet north of PI-182

Easy Drilling
Installed 15 foot of 2" PVC pipe as observation well
(Groundwater may rise in Beaver Creek during wet season)

NOTE: Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO: APB1-140 — DWG NO: FP-HV 8042

LOG OF TEST PIT OR AUGER HOLE FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No: APB1-145

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Station: 3897+50 — Coordinates N: 484,897 E: 2,430,472 — Ground Elevation: 2645 — Approx Dimensions: 9" Auger

Date & Depth to Water: Not Encountered — Method of Excavation: Mobile B-50 — Date: 6/26/81 — Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	DENSITY	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART)—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.2			0.0' - 0.2' TOPSOIL - about 5% fine gravel, 15% sand, 50% low plasticity fines, 30% organic material, Maximum Size 3/4", Color brown, Moisture dry.			
			SPT N = 28	9				
CL					0.2' - 14.3' SILTY CLAY - about 10% coarse to fine gravel, 10% sand, 80% low to medium plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, gravel and sand lenses, carbonaceous zones, glacial till (CL).		0	0
			SPT N = 38	10				
		14.3	SPT N = 50	8				

REMARKS: After Auger Removed, Hole Sloughed to 11.2 feet
Hole Backfilled 6/26/81
Limit of Auger = 14.3 feet
Drilled 18 feet west of Control Point 188

Moderately Difficult Drilling

NOTE: Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO: APB1-145 — DWG NO: FP-HV 8043

97

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-150

Feature Fort Peck - Havre 230 KV Transmission Line
Station 4145+28 Coordinates N 495,211 E 2,407,965 Ground Elevation 2338 State Montana
Date & Depth to Water Not Encountered Method of Excavation Power Pole Auger Date 6/26/81 Logged by W. Henning Approx Dimensions 22" Auger

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION. GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
SC		0.5	5. Sack	3	0.0' - 0.5' TOPSOIL- about 20% fine sand, 70% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
		10.0	5. Sack	3	0.5' - 10.0' CLAYEY SAND WITH COBBLES AND BOULDERS - about 10% coarse to fine gravel, 60% predominantly fine sand, 30% low plasticity fines, Maximum Size 8", subrounded, Color brown, Moisture moist, dense, glacial till (SC). Auger refusal at 10.0 feet due to cobbles and boulders.		5	3

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/26/81
Bottom of Hole = 10.0 feet (Auger Refusal at 6 feet, moved 15 feet east and redrilled, auger refusal at 10 feet in second hole, possible large boulders)

Very Difficult Drilling below 6.0 feet
Drilled 10 feet east of P1-193

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-150 DWG NO FP-HV 8044

98

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-155

Feature Fort Peck - Havre 230 KV Transmission Line
Station 4194+00 Coordinates N 500,109 E 2,407,859 Ground Elevation 2253 State Montana
Date & Depth to Water Not Encountered Method of Excavation Mobile B-50 Date 6/26/81 Logged by K. Barnes Approx Dimensions 9" Auger

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION. GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.4	SPT N = 23	4	0.0' - 0.4' TOPSOIL - about 10% fine sand, 60% low plasticity fines, 30% organic material, Maximum Size fine sand, Color brown, Moisture moist,			
		10	SPT N = 16	10	0.4' - 14.3' SANDY CLAY- about 5% fine gravel, 34% predominantly fine sand, 61% low to medium plasticity fines, Maximum Size 3/4", Color brown, Moisture moist, hard, alluvial (CL).		0	0
		14.3	SPT N = 20	14				

LL %	PI %	Gravel %	Sand %	Fines %
30	15	5	34	61

REMARKS After Auger Removed, Hole Sloughed to 11.8 feet
Hole Backfilled 6/26/81
Limit of Auger = 14.3 feet
Drilled 200 feet north of P1-194

Moderate to Easy Drilling
Installed 15 feet of 2" PVC pipe as observation well.

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-155 DWG NO FP-HV 8045

99

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-160

Feature Fort Peck - Havre 230 KV Transmission Line
Station 4248+80 Coordinates N 501,127 E 2,402,788 Ground Elevation 2263 State Montana
Date & Depth to Water Not Encountered Method of Excavation Power Pole Auger Date 6/26/81 Logged by W. Henning Approx Dimensions 22" Auger

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		9.0	S. Sack	8	0.0' - 9.0' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% coarse to fine gravel, 10% sand, 80% low plasticity fines, Maximum Size 10", Color brown, Moisture dry to moist, hard, glacial till (CL). Auger refusal at 9.0 feet due to large cobbles and boulders.		5	5
			S. Sack	6				

REMARKS After Auger Removal, Hole Stood Open
Hole Backfilled 6/26/81
Bottom of Hole = 9.0 feet (Auger refusal at 9.0 feet; moved 10.0 feet north and redrilled, auger refusal again at 9.0 feet; possible large boulders)

Very Difficult Drilling
Drilled 35 feet north of P1-196

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-160 DWG NO FP-HV 8046

WAPA F 6400.1 (3-80)

100

SUBSURFACE EXPLORATION · PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-165 — Coordinates N: 502,462 — E: 2,398,486 — Ground Elevation: 2247

Depth and Elev of Water Level*: 8.0 — Location: 1300 feet east and 60 feet north of section corner 7,8,17,18; R30E, T30N — Total Depth: 57.7 feet

Station 4295+50

*Date Measured: 11/5/81 — Date Begun: 11/5/81 — Finished: 11/5/81 — Logged by: V. Bedi — Reviewed by: A. Stilley

NOTES
Water losses, type and size of hole, drilling method and conditions, Caving and other information

Drill Equipment:
Mobile B-50 Rotary, Truck-mounted

Driller:
B. Neff

Method:
Drilled with 9" diameter hollow-stem augers. Drive samples (SPT) taken at the intervals listed below.

Drive Sample Intervals, feet:
2.7 - 4.2
7.7 - 9.2
12.7 - 14.2
17.7 - 19.2
22.7 - 24.2
27.7 - 29.2
32.7 - 34.2
37.7 - 39.2
42.7 - 44.2
47.7 - 49.2
52.7 - 54.7
No sample possible at 57.7 ft. due to 4 feet of suck-up

Progress Report:
0-57.7' 11/5/81
Installed 20 feet of 1½" diameter PVC pipe as observation well. After auger removed, hole caved to 20 feet.

Easy Drilling

Hole Backfilled:
11/5/81

Water Level
8.0' 11/5/81

CORE RECOVERY-%	BLOWS/FOOT	WATER CONTENT-%	SAMPLES FOR TESTING
87	18	21	SPT
67	4	32	SPT
67	3	34	SPT
60	7	26	SPT
33	12	23	SPT
67	20	31	SPT
73	16	29	SPT
100	25	36	SPT
100	26	38	SPT
100	12	26	SPT
60	4	18	SPT

PENETRATION RESISTANCE — Blows per Foot
Weight of Hammer: 140 lb. — Height of Drop: 30 in.

DEPTH (FT.)	GRAPHIC LOG
0.4	CH
15.5	SM
25.5	CH
52.5	SM
55.2	GW
57.7	

CLASSIFICATION AND DESCRIPTION OF MATERIAL

0.0'-0.4' CLAYEY GRAVEL - about 40% gravel, 20% sand, 40% medium plasticity fines, Maximum Size 2", Color Brown, Moisture moist, dense (road base).

0.4'-15.5' FAT CLAY - about 20% fine sand, 80% high plasticity fines, Maximum Size fine sand, Color Brown, Moisture moist to saturated, very soft to soft, alluvial (CH).

15.5'-25.5' SILTY SAND - about 80% fine sand, 20% low plasticity fines, Maximum Size fine sand, Color Gray, Moisture saturated, loose to medium dense, alluvial (SM).

25.5'-52.5' FAT CLAY - about 10% fine sand, 90% high plasticity fines, Maximum Size fine sand, Color Gray, Moisture very moist, stiff to very stiff, alluvial (CH).

52.5'-55.2' SILTY SAND - about 85% fine sand, 15% low plasticity fines, Maximum Size fine sand, Color Gray, Moisture saturated, very loose, alluvial (SM).

55.2'-57.7' SANDY GRAVEL - about 50% gravel, 30% sand, 20% low plasticity fines, Maximum Size 2", Color Gray, Moisture saturated, dense, alluvial (GW).

EXPLANATION

BLOWS/FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows/foot

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size ¼ inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○

FEATURE: Fort Peck-Havre 230 KV Transmission Line — STATE: Montana — HOLE NO PR: 81-165 — DWG NO.: FP-HV 8047

WAPA F 6400.1 (3-80)

101

SUBSURFACE EXPLORATION · PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-169 — Coordinates N: 505,110 — E: 2,394,509 — Ground Elevation: 2249

Depth and Elev of Water Level*: 7.5 — Location: 65 feet east of Control Point 200 — Total Depth: 59.5 feet

Station 4359+50

*Date Measured: 10/30/81 — Date Begun: 10/30/81 — Finished: 10/30/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES
Water losses, type and size of hole, drilling method and conditions, Caving and other information

Drill Equipment:
Mobile B-50 Rotary, Truck-mounted

Driller:
B. Neff

Method:
Drilled with 9" diameter hollow-stem augers. Drive samples (SPT) taken at the intervals listed below.

Drive Sample Intervals, feet:
3.0 - 4.5
8.0 - 9.5
13.0 - 14.5
18.0 - 19.5
23.0 - 24.5
28.0 - 29.5
33.0 - 34.5
38.0 - 39.5
43.0 - 44.5
48.0 - 49.5
53.0 - 54.5
58.0 - 59.5

Progress Report:
0-58.5' 10/30/81
No observation well installed as hole drilled at the edge of a gravelled road. Observation well previously installed at hole AP81-170 65 feet west of this drill hole. After auger removed, hole caved to 40 feet.
Easy drilling

Hole Backfilled:
10/30/81

Water Level:
7.5' 10/30/81

CORE RECOVERY-%	BLOWS/FOOT	WATER CONTENT-%	SAMPLES FOR TESTING
85	11	22	SPT
100	11	31	SPT
100	8	37	SPT
100	7	31	SPT
100	7	33	SPT
100	4	24	SPT
100	3	28	SPT
100	15	41	SPT
100	9	34	SPT
100	18	34	SPT
100	20	34	SPT
0	18	-	SPT

PENETRATION RESISTANCE — Blows per Foot
Weight of Hammer: 140 lb. — Height of Drop: 30 in.

DEPTH (FT.)	GRAPHIC LOG
1.0	CH
24.0	SM
37.0	CH
59.5	

CLASSIFICATION AND DESCRIPTION OF MATERIAL

0.0-1.0' SILTY GRAVEL - about 40% gravel, 20% sand, 40% medium plasticity fines, Maximum Size 2", Color Brown, Moisture moist, dense (road base).

1.0'-24.0' FAT CLAY - about 1% fine sand, 99% high plasticity fines, Maximum Size fine sand, Color Gray, Moisture saturated, stiff to firm, salts, alluvial (CH).

LL	PI	Gravel	Sand	Fines
%	%	%	%	%
74	44	0	1	99

24.0'-37.0 SILTY SAND - about 70% fine sand, 30% low plasticity fines, Maximum Size fine sand, Color Gray, Moisture saturated, loose to very loose, alluvial (SM)

37.0'-59.5' FAT CLAY - about 100% high plasticity fines, Maximum Size silt, Color Gray, Moisture saturated, stiff to very stiff, alluvial (CH).

EXPLANATION

BLOWS/FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows/foot

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size ¼ inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○

FEATURE: Fort Peck-Havre 230 KV Transmission Line — STATE: Montana — HOLE NO. PR: 81-169 — DWG NO.: FP-HV 8048

WAPA F 6400.6 (formerly WAPA-182-1)

102

LOG OF TEST PIT OR AUGER HOLE FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No: AP81-170

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Station: 4301+50 — Coordinates N: 505,120 ; E: 2,394,434 — Ground Elevation: 2248 — Approx. Dimensions: 22" Auger

Date & Depth to Water: 6/26/81; 9.0 feet — Method of Excavation: Power Pole Auger — Date: 6/26/81 — Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL (LETTER)	(GRAPHIC)	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART — "UNIFIED SOIL CLASSIFICATION." GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 15% fine sand, 70% low plasticity fines, 15% organic material, Maximum Size fine sand, Color brown, Moisture moist.			
			5. Sack	27				
CH					0.5' - 15.0' FAT CLAY - about 3% fine sand, 97% high plasticity fines, some scattered gravel from 9-12 feet, Maximum Size 3/4", Color brown gray, Moisture moist to saturated, alluvial (CH).		0	0
			5. Sack	23				
					LL % / PI % / Gravel % / Sand % / Fines %: 59 / 37 / 0 / 3 / 97			
			5. Sack	30				
		15.0						

REMARKS: After Auger Removed, Hole Caved to 9 feet
Hole Backfilled 6/26/81
Required Depth = 15.0 feet
Drilled 15 feet northwest of Control Point 200

Easy Drilling
Installed 15 feet of 2" PVC pipe as observation well.

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO: AP81-170 — DWG NO: FP-HV 8049

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-175

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 4477+65 — Coordinates N 510,691 E 2,385,338 — Ground Elevation 2440 — Approx Dimensions 9" Auger
Data & Depth to Water: Not Encountered — Method of Excavation: Mobile B-50 — Date: 6/26/81 — Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3 5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.3	SPT N = 36	5	0.0' - 0.3' TOPSOIL - about 10% fine to coarse gravel, 15% sand, 40% low plasticity fines, Maximum Size 2", Color brown, Moisture dry, firm.			
			5PT N = 46	9	0.3' - 14.3' SILTY CLAY WITH COBBLES - about 10% coarse to fine gravel, 10% sand, 80% low to medium plasticity fines, Maximum Size 4", Color brown, Moisture moist, hard, lenses of sand and gravel, glacial till (CL).		5	0
		14.3	5PT N = 32	14				

REMARKS
After Auger Removed, Hole Sloughed to 11.2 feet
Hole Backfilled 6/26/81
Limit of Auger = 14.3 feet
Drilled 24 feet south of P1-204

Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-175 — DWG NO FP-HV 8050

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-180

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 4718+50 — Coordinates N 510,495 E 2,360,955 — Ground Elevation 2616 — Approx Dimensions 22" Auger
Data & Depth to Water: Not Encountered — Method of Excavation: Power Pole Auger — Date: 6/26/81 — Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL			5. 5ack	14	0.0' - 8.0' SILTY CLAY - about 5% fine to coarse gravel, 10% fine to coarse sand, 85% low plasticity fines, Maximum Size 3", Color brown, Moisture moist, glacial till (CL).		0	0
		8.0	5. 5ack	11	8.0' - 8.2' SANDSTONE - about 80% fine sand, 20% non-plastic fines, Maximum Size fine sand, Color brown, Moisture dry, very dense, well cemented, cap rock.		0	0
		8.2						

REMARKS
After Auger Removed, Hole Stood Open
Hole Backfilled 6/26/81
Bottom of Hole = 8.2 feet, Auger Refusal
Drilled 25 feet east of Control Point 209

Moderately Difficult Drilling to 8.0 feet.

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-180 — DWG NO FP-HV 8051

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-185

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 4881+00 — Coordinates N 510,218 E 2,344,734 — Ground Elevation 2564 — Approx Dimensions 22" Auger
Data & Depth to Water: Not Encountered — Method of Excavation: Power Pole Auger — Date: 6/25/81 — Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.5	5. 5ack	10	0.0' - 0.5' TOPSOIL - about 20% fine sand, 70% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture moist.			
		5.0			0.5' - 5.0' SANDY CLAY - about 10% coarse to fine gravel, 15% sand, 75% low plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, glacial till (CL).		0	0
SM			5. 5ack	7	5.0' - 12.0' SILTY SAND - about 60% coarse to fine sand, 40% non-plastic fine, Maximum Size coarse sand, subangular, Color light brown, Moisture moist, dense (SM).		0	0
		12.0						
		13.0	5. 5ack	4	LL % — PI % — Gravel % — Sand % — Fines % Granular — Non-Plastic — 0 — 60 — 40			
					12.0' - 13.0' SANDSTONE - about 70% fine sand, 30% non-plastic fines, Maximum Size - fine sand, Color gray, Moisture dry, very dense, moderate to well cemented.		0	0

REMARKS
After Auger Removed, Hole Stood Open
Hole Backfilled 6/26/81
Bottom of Hole = 13 feet (Auger refusal at 9.0 feet; moved 10.0' feet east and redrilled, auger refusal at 13.0' feet in second hole).

Very Difficult Drilling below 12.0 feet
Drilled 15 feet east of Control Point 213

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-185 — DWG NO FP-HV 8052

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-190

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 5082+46 — Coordinates N 509,839 E 2,324,866 — Ground Elevation 2394 — Approx Dimensions 9" Auger
Data & Depth to Water: Not Encountered — Method of Excavation: Mobile 8-50 — Date: 6/26/81 — Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.3			0.0' - 0.3' TOPSOIL - about 5% fine gravel, 10% sand, 60% low plasticity fines, 25% organic material, Maximum Size 1/2", Color brown, Moisture dry.			
		1.5	SPT N = 28	5	0.3' - 1.5' SILTY CLAY - about 5% fine gravel, 5% sand, 90% low plasticity fines, Maximum Size 1/2", Color brown, Moisture moist, alluvial (CL).		0	0
CL			SPT N=50/0.4	5	1.5' - 14.3' SILTY CLAY - about 10% coarse to fine gravel, 10% sand, 80% low to medium plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, glacial till (CL).		0	0
		14.3	SPT N = 24	10				

REMARKS
After Auger Removed, Hole Caved to 9.7 feet
Hole Backfilled 6/25/81
Limit of Auger = 14.3 feet
Drilled 38 feet south of PI-218

Moderately Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-190 — DWG NO FP-HV 8053

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-195

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 700' north of 528+00 — Coordinates N 522,817 E 2,308,970 — Ground Elevation: 2526 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile B-50 — Date: 6/25/81 — Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3			0.0' - 0.3' TOPSOIL - about 15% fine gravel, 10% sand, 40% low plasticity fines, 35% organic material, Maximum Size 3/4", Color brown, Moisture dry.			
			SPT N = 23	7				
CL					0.3' - 14.3' SANDY CLAY - about 15% predominantly fine gravel, 15% fine to medium sand, 70% low to medium plasticity fines, Maximum Size 3", Color brown, Moisture moist, hard, sand and gravel lenses, glacial till (CL).		0	0
			SPT N = 36	9				
		14.3	SPT N = 50	12				

REMARKS: After Auger Removed, Hole Sloughed to 11.1 feet
Hole backfilled 6/25/81
Limit of Auger = 14.3 feet
Drilled 24 feet west of Control Point 222.1

Moderately Difficult Drilling

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-19S — DWG NO FP-HV 8054

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-200

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: S474+94 — Coordinates N 532,858 E 2,293,049 — Ground Elevation: 2505 — Approx Dimensions: 22" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Power Pole Auger — Date: 6/25/81 — Logged by: W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5	S. Sack	4	0.0' - 0.5' TOPSOIL - about 20% fine sand, 70% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, loose.			
SM			S. Sack	3	0.5' - 15.0' SILTY SAND - poorly graded, about 5% coarse to fine gravel, 74% predominantly medium to fine sand, 21% low plasticity fines, Maximum Size 2", subrounded, Color light brown, Moisture moist (SM).		0	0
			S. Sack	4	LL % 22 — PI % 2 — Gravel % 5 — Sand % 74 — Fines % 21			
		15.0						

REMARKS: After Auger Removed, Hole Caved to 12 feet
Hole Backfilled 6/25/81
Required Depth = 15.0 feet
Drilled at PI-226

Easy Drilling

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-200 — DWG NO FP-HV 8055

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-205

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 5560+00 — Coordinates N 532,976 E 2,284,548 — Ground Elevation: 2516 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile B-50 — Date: 6/25/81 — Logged by: K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.1			0.0' - 0.1' TOPSOIL - about 5% gravel, 15% sand, 50% low plasticity fines, 30% organic material, Maximum Size 3/4", Color brown, Moisture dry firm.			
CL			SPT N = 39	15				
		S.5			0.1' - S.5' SILTY CLAY - About 5% fine gravel, 10% sand, 85% medium plasticity fines, Maximum Size 3/4", Color dark brown, Moisture moist, hard glacial till (CL).		0	0
GP-GM			SPT N = 25	16	S.5' - 12.0' SANDY GRAVEL - Poorly graded - about 60% predominantly fine gravel, 30-37% coarse to fine sand, 3-10% non-plastic fines, Maximum Size 1½", subrounded, Color gray, Moisture dry, medium dense, lensed, glacial till (GP-GM).		0	0
		12.0						
			SPT N = 40	22				
		14.4			12.0' - 14.4' CLAYSTONE SHALE - about 2% sand, 98% high plasticity fines, Maximum size fine sand, Color gray, Moisture moist, hard, blocky.		0	0

REMARKS: After auger removed, hole caved to 10.8 feet
Hole backfilled 6/25/81
Limit of Auger - 14.4 feet
Drilled 12 feet west of Control Point 228

Moderately Difficult Drilling

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-20S — DWG NO FP-HV 8056

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-209

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana
Station: 5710+00 — Coordinates N 532,907 E 2,269,649 — Ground Elevation: 2480 — Approx Dimensions: 9" Auger
Date & Depth to Water: Not Encountered — Method of Excavation: Mobile B-50 — Date: 10/30/81 — Logged by: M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 10% gravel, 20% sand, 30% medium plasticity fines, 40% organic material, Maximum Size 3/4", Color Brown, Moisture moist, stiff		0	0
			SPT N=22	10				
CL					0.4' - 9.0' SILTY CLAY - about 10% gravel, 20% sand, 70% low to medium plasticity fines, Maximum Size 1", Color Brown, Moisture slightly moist, very stiff to hard, sand lenses, glacial till (CL)		0	0
		9.0	SPT N=32	11				
SM					9.0' - 12.0' SILTY SAND - about 70% sand, 30% non-plastic fines, Maximum Size medium sand, Color Tan, Moisture slightly moist, dense (SM)		0	0
		12.0						
			SPT N=50	21	12.0' - 14.5' CLAYSTONE SHALE - about 5% sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color gray, Moisture moist, hard, blocky, oxides, Judith River formation.		0	0
		14.5						

REMARKS: After auger removed, hole remained open
Hole backfilled 10/30/81
Limit of Augers = 14.5 feet
Drilled 10 feet southwest of control point 231

Easy Drilling

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-209 — DWG NO FP-HV 8057

(formerly WAPA 182 1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-210

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 58S4+38 — Coordinates N 532,746 E 2,255,105 — Ground Elevation 2341 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/25/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.0						
CL		0.5	S. Sack	7	0.0' - 0.5' TOPSOIL - about 70% fine sand, 20% low plasticity fines, 10% organic material, Maximum Size fine sand, Color brown, Moisture dry, loose.			
			S. Sack	12	0.5' - 10.0' SANDY CLAY - about 15% gravel, 20% sand, 65% low to medium plasticity fines, Maximum Size 3", Color brown, Moisture dry to moist, hard, glacial till (CL).		0	0
		10.0			10.0' - 10.2' SANDSTONE - about 75% fine sand, 25% non-plastic fines, Maximum Size fine sand, subangular, Color brown, Moisture dry, dense, cap rock.		0	0
		10.2						

REMARKS After auger removed, hole stood open
Hole backfilled 6/25/81
Bottom of hole = 10.2 feet (Auger Refusal)
Drilled 10 feet south of P1-234

Difficult Drilling below 10.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-210 — DWG NO FP-HV 8058

(formerly WAPA 182 1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-215

Feature Fort Peck - Havre 230 KV Transmission Line — State
Station 5999+15 — Coordinates N 539,255 E 2,242,177 — Ground Elevation 2409 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/25/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.0						
		0.1			0.0' - 0.1' TOPSOIL - about 30% coarse to fine gravel, 25% sand, 20% low plasticity fines, 25% organic material, Maximum Size 4", subrounded, Color brown, Moisture dry, loose.		10	0
GP-GM			N SPT 80	1	0.1' - 14.5' SILTY GRAVEL WITH COBBLES AND BOULDERS, skip-graded, about 45% coarse to fine gravel, 46% predominantly medium to fine sand, 9% low plasticity fines, Maximum Size 8", subrounded, Color brown, Moisture dry, dense, glacial till (GP-GM)		15	5
			N SPT 33	2	LL % 20 — PI % 1 — Gravel % 45 — Sand % 46 — Fines % 9			
		14.5	N SPT 71	2				

REMARKS After auger removed, hole caved to 1.5 feet
Hole backfilled 6/25/81
Limit of auger = 14.5 feet
Drilled 18 feet south of P1-237

Very Difficult Drilling due to cobbles and boulders

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-215 — DWG NO FP-HV 8059

(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-216

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6102+00 — Coordinates N 543,148 E 2,232,590 — Ground Elevation 2420 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/30/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.0						
		0.4	SPT N=29	20	0.0' - 0.4' TOPSOIL - about 20% gravel, 10% sand, 30% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 12", Color Brown, Moisture moist, stiff.		5	4
CL					0.4' - 12.0' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 15% sand, 75% medium plasticity fines, Maximum Size 6", Color brown gray, Moisture moist, very stiff to hard, glacial till (CL)		3	2
			SPT N=43	14				
		12.0			12.0' - 14.5' CLAYSTONE SHALE - about 5% sand, 95% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, very stiff, blocky, oxides, weathered, Judith River formation.		0	0
			SPT N=19	26				
		14.5						

REMARKS After auger removed, hole remained open
Hole backfilled 10/30/81
Limit of Augers = 14.5 feet
Drilled 5 feet west of control point 3023

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-216 — DWG NO FP-HV 8060

(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-220

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6235+50 — Coordinates N 548,772 E 2,220,385 — Ground Elevation 2385 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/25/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.0						
		0.5	S. Sack	9	0.0' - 0.5' TOPSOIL - about 20% sand, 60% low plasticity fines, 20% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
CL					0.5' - 7.5' SANDY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 15% sand, 70% low to medium plasticity fines, Maximum Size 8", Color brown, Moisture moist, hard, glacial till (CL). Auger refusal at 7.5 feet due to boulders		5	3
		7.5						

REMARKS After auger removed, hole stood open
Hole backfilled 6/25/81
Bottom of hole = 7.5 feet (Auger Refusal)
Drilled 10 feet east of Control Point 242

Very Difficult Drilling due to cobbles and boulders

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-220 — DWG NO FP-HV 8061

(Formerly WAPA-182-1)

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LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No APB1-225

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6463+07 — Coordinates N 558,204 E 2,199,880 — Ground Elevation 2465 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/25/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.2			0.0' - 0.2' TOPSOIL - about 10% fine gravel, 10% sand, 80% low plasticity fines, 30% organic material, Maximum Size 3/4", Color brown, Moisture dry, firm.			
			SPT N = 36					
CL					0.2' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 10% sand, 80% medium plasticity fines, Maximum Size 6", Color brown, Moisture moist, hard, glacial till (CL).		3	2
			SPT N = 50					
			SPT N = 51					
		14.5						

REMARKS
After augers removed, hole sloughed to 11.3 feet
Hole backfilled 6/25/81
Limit of Auger = 14.5 feet
Drilled 15 feet south of PI 246

Moderate to Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO APB1-22S — DWG NO FP-HV 8062

(Formerly WAPA-182-1)

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LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No APB1-230

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6681+43 — Coordinates N 562,293 E 2,178,846 — Ground Elevation 2401 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/25/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.0			0.0' - 0.5' TOPSOIL - about 20% fine sand, 60% low plasticity fines, 20% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
CL			S. Sack	7				
		5.0			0.5' - 5.0' SANDY CLAY WITH COBBLES - about 10% gravel, 20% sand, 70% low plasticity fines, Maximum Size 4", Color light brown, Moisture moist, firm to hard, glacial till, (CL).		2	0
			S. Sack	4				
ML					5.0' - 15.0' SANDY SILT - about 5% gravel, 38% sand, 57% non-plastic fines, Maximum Size 2", Color brown, Moisture moist, medium dense, glacial till (ML).		0	0
			S. Sack	3				
		15.0						

LL %	PI %	Gravel %	Sand %	Fines %
Granular Non-Plastic		5	38	57

REMARKS
After auger removed, hole stood open
Hole backfilled 6/25/81
Required Depth = 15.0 feet
Drilled 10 feet east of PI-250

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO APB1-230 — DWG NO FP-HV 8063

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LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No APB1-235

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6789+50 — Coordinates N 557,045 E 2,170,805 — Ground Elevation 2358 — Approx Dimensions 9" Auger
Date & Depth to Water 6/25/81 8.5 feet — Method of Excavation Mobile B-50 — Date 6/25/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
GM		0.6			0.0' - 0.6' FILL SILTY GRAVEL - poorly graded, about 30% gravel, 25% sand, 20% non-plastic fines, 25% organic material, Maximum Size 3", subrounded, Color brown, Moisture dry, loose (GM).		0	0
			SPT N = 15	33				
CL					0.6' - 14.4' SILTY CLAY - about 5% sand, 95% low to medium plasticity fines, Maximum Size fine sand, Color dark brown, Moisture moist to saturated, firm, alluvial (CL).		0	0
			SPT N = 9	37				
			SPT N = 15	30				
		14.4						

REMARKS
After auger removed, hole stood open
Hole backfilled 6/25/81
Limit of Auger = 14.4 feet
Drilled 123 feet east of Control Point 254

Easy Drilling, 15' of 2" PVC pipe installed as observation well

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO APB1-23S — DWG NO FP-HV 8064

(Formerly WAPA-182-1)

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LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No APB1-239

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 6874+05 — Coordinates N 556,916 E 2,163,953 — Ground Elevation 2353 — Approx Dimensions 9" Auger
Date & Depth to Water 10/30/81 10.5'* — Method of Excavation Mobile B-50 — Date 10/30/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' SILTY GRAVEL - about 45% gravel, 20% sand, 35% medium plasticity fines, scattered cobbles, Maximum Size 4", Color Brown, Moisture moist, dense (road base).		5	0
			SPT N=8	36				
CL					0.4' - 10.0' SILTY CLAY WITH COBBLES - about 10% gravel, 10% sand, 80% medium to high plasticity fines, Maximum Size 4", Color Gray, Moisture moist to saturated, fine, alluvial (CL)		5	0
			SPT N=6	26				
		10.0			10.0' - 14.5' SANDY SILT - about 28% fine sand, 72% non-plastic fines, Maximum Size fine sand, Color Gray, Moisture saturated, firm, alluvial (ML)			
			SPT N=5	23				
		14.5						

LL %	PI %	Gravel %	Sand %	Fines %
Granular Non-plastic		0	28	72

REMARKS
After auger removed, hole caved to 11 feet
Hole backfilled 10/30/81
Limit of Augers = 14.5 feet
Drilled 50 feet south of PI-256

Easy Drilling
*No observation well installed as hole drilled on edge of road. Observation wells previously installed in the vicinity at hole locations APB1-235 & APB1-240

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO APB1-239 — DWG NO FP-HV 8065

WAPA F 6400 6
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-240

Feature Fort Peck - Havre 230 KV Transmission Line
State
Station 6927+50 Coordinates N 551,917 E 2,163,885 Ground Elevation 2347 Approx Dimensions 22" Auger
Date & Depth to Water 6/25/81 11.0 feet Method of Excavation Power Pole Auger Date 6/25/81 Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CH		0.5			0.0' - 0.5' TOPSOIL - about 5% fine sand, 75% medium plasticity fines, 20% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
CL		2.0	S. Sack	12	0.5' - 2.0' FAT CLAY - about 98% high plasticity fines, 2% sand, Maximum Size fine sand, Color gray, Moisture moist, firm (CH).		0	0
CH		5.0	S. Sack	17	2.0' - 5.0' SILTY CLAY - about 15% sand, 85% medium plasticity fines, Maximum Size fine sand, Color brown, Moisture moist, firm (CL).		0	0
CL		10.0	S. Sack	30	5.0' - 10.0' FAT CLAY - about 5% sand, 95% high plasticity fines, Maximum Size fine sand, Color gray, Moisture wet, firm (CH).		0	0
		15.0			10.0' - 15.0' SILTY CLAY - about 10% fine sand, 90% low to medium plasticity fines, Maximum Size fine sand, Color brown, Moisture wet to saturated, firm (CL).		0	0

REMARKS
After auger removed, hole caved to 11.0 feet
Hole backfilled 6/25/81
Required Depth = 15.0 feet
Drilled 3 feet east of Control Point 257

Easy Drilling, 15 feet of 2" PVC pipe installed as observation well.

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-240 DWG NO FP-HV 8066

WAPA F 6400 6
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-245

Feature Fort Peck - Havre 230 KV Transmission Line
State Montana
Station Coordinates N 565,125 E 2,153,104 Ground Elevation 2356 Approx Dimensions 9" Auger
Date & Depth to Water 6/25/81 6.8 feet Method of Excavation Mobile 8-50 Date 6/25/81 Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.5	SPT N = 38	12	0.0' - 0.5' TOPSOIL - about 10% sand, 50% low plasticity fines, 40% organic material, Maximum Size medium sand, Color brown, Moisture moist, firm.			
		6.0	SPT N = 5	24	0.5' - 6.0' SILTY CLAY - about 3% sand, 97% medium plasticity fines, Maximum Size fine sand, Color brown, Moisture moist to wet, hard, alluvium (CL).		0	0
SM		14.2	SPT N = 2	20	LL % 41; PI % 20; Gravel % 0; Sand % 3; Fines % 97			
					6.0' - 14.2' SILTY SAND - uniformly graded, about 70% fine sand, 30% non-plastic fines, Maximum Size fine sand, subangular, Color brown, Moisture wet to saturated, loose, alluvial (SM).		0	0

REMARKS
After auger removed, hole caved to 8 feet
Hole backfilled 6/24/81
Limit of Auger = 14.2 feet
Drilled 18 feet north of control point 406

Very Easy Drilling
14.5 feet of 2" PVC pipe installed as observation well

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-245 DWG NO FP-HV 8067

WAPA F 6400 6
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-249

Feature Fort Peck - Havre 230 KV Transmission Line
State Montana
Station 7119+00 Coordinates N 550,533 E 2,148,407 Ground Elevation 2400 Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered Method of Excavation Mobile 8-50 Date 6/24/81 Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.0			0.0' - 1.5' FILL GRAVELLY CLAY WITH COBBLES - about 20% gravel, 10% sand, 70% low to medium plasticity fines, Maximum Size 4", Color brown, Moisture dry, hard, road-base (CL).		1	0
		1.5	SPT N = 9	12				
SC			SPT N = 22	9	1.5' - 14.2' CLAYEY SAND - poorly graded, about 5% fine gravel, 60% predominantly medium to fine sand, 35% low plasticity fines, Maximum Size 1/2", subangular, Color brown, Moisture moist, medium dense, glacial till (SC).		0	0
		14.2	SPT N = 19	17				

REMARKS
After auger removed, hole sloughed to 11.3 feet
Hole backfilled 6/24/81
Limit of Auger = 14.2 feet
Drilled 50 feet east of Control Point GLO 21/21

Easy to Moderately Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-249 DWG NO FP-HV 8068

WAPA F 6400 6
(formerly WAPA-182-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-250

Feature Fort Peck - Havre 230 KV Transmission Line
State Montana
Station Coordinates N 2563,418 E 2,142,728 Ground Elevation 2361 Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered Method of Excavation Power Pole Auger Date 6/25/81 Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
ML-CL		0.5	S. Sack	7	0.0' - 0.5' TOPSOIL - about 15% fine sand, 65% low plasticity fines, 20% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
		5.0	S. Sack	20	0.5' - 5.0' SILTY CLAY - about 15% sand, 85% low plasticity fines, Maximum Size fine sand, Color brown, Moisture moist to firm (ML-CL).		0	0
CH			S. Sack	21	5.0' - 15.0' FAT CLAY - about 3% sand, 97% high plasticity fines, Maximum Size fine sand, Color dark brown, Moisture moist, hard (CH).		0	0
		15.0						

REMARKS
After auger removed, hole stood open
Hole backfilled 6/25/81
Required Depth = 15.0 feet
Drilled 30 feet east of Control Point 409

Moderately Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-250 DWG NO FP-HV 8069

123

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-255

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station — Coordinates N 559,347 E 2,131,368 — Ground Elevation 2401 — Approx Dimensions 9" Auger
Date & Depth to Water 6/24/81 8.0 feet — Method of Excavation Mobile B-50 — Date 6/24/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 15% sand, 60% low plasticity fines, 25% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
CL			SPT N = 15	14	0.4' - 14.2' SANDY CLAY - about 44% sand, 66% medium plasticity fines, Maximum Size coarse sand, Color brown, Moisture moist to saturated, hard to firm, glacial till (CL).		0	0
			SPT N = 15	24	LL % 35 — PI % 20 — Gravel % 0 — Sand % 44 — Fines % 66			
		14.2	SPT N = 11	17				

REMARKS
After auger removal, hole sloughed to 11.3 feet
Hole backfilled 6/24/81
Limit of Auger = 14.2 feet
Drilled 6 feet south of Control Point 413

Moderately difficult drilling.
Installed 15.5 feet 2" PVC pipe as observation well.

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-255 — DWG NO FP-HV 8070

WAPA F 6400 3 (formerly WAPA-102-T)

124

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-260

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 1850' north of 7401+00 — Coordinates N 560,102 E 2,122,310 — Ground Elevation 2401 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/24/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.6	S. Sack	8	0.0' - 0.6' TOPSOIL - about 20% sand, 60% low plasticity fines, 20% organic material, Maximum Size fine sand, Color brown, Moisture dry, stiff.			
CL			S. Sack	12	0.6' - 15.0' SILTY CLAY - about 10% gravel, 10% sand, 80% low plasticity fines, Maximum Size 2", Color brown, Moisture moist, hard, glacial till (CL).		0	0
			S. Sack	11				
		15.0						

REMARKS
After auger removed, hole stood open
Hole backfilled to 6/24/81
Required Depth = 15.0 feet
Drilled at Control Point 2684

Easy Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-260 — DWG NO FP-HV 8071

WAPA F 6400 6 (formerly WAPA-102-T)

125

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-261

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 7521+50 — Coordinates N 558,905 E 2,110,375 — Ground Elevation 2442 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/31/81 — Logged by V. Bedi

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		1.0			0.0' - 1.0' SANDY GRAVEL - about 60% gravel, 30% sand, 10% low plasticity fines, scattered cobbles, Maximum Size 4", Color Brown, Moisture slightly moist, dense (road base).		10	0
CL			SPT N=9	14	1.0' - 12.0' SILTY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 20% sand, 70% low plasticity fines, Maximum Size 4", Color Brown, Moisture slightly moist to moist, stiff, sand lenses, glacial till (CL)		3	2
			SPT N=10	15				
		12.0			12.0' - 14.5' SANDY CLAY - about 30% sand, 70% low plasticity fines, Maximum Size fine sand, Color Brown, Moisture slightly moist to moist, stiff, sand lenses, glacial till (CL)		0	0
CL			SPT N=12	14				
		14.5						

REMARKS
After auger removed, hole remained open
Hole backfilled 10/31/81
Limit of Augers = 14.5 feet
Drilled 35 feet east and 5 feet north of control point 270A

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-261 — DWG NO FP-HV 8072

WAPA F 6400 4 (formerly WAPA-102-T)

126

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-265

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 7759+00 — Coordinates N 558,722 E 2,098,094 — Ground Elevation 2507 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/24/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3	SPT N = 41		0.0' - 0.3' TOPSOIL - about 5% gravel, 10% sand, 60% low plasticity fines, 25% organic material, Maximum Size 2", Color brown, Moisture dry, firm.			
GM			SPT N = 9		0.3' - 14.3' SILTY GRAVEL - skip-graded, about 40% predominantly coarse gravel, 30% non-plastic fines, Maximum Size 3", subrounded, Color light brown, Moisture moist, loose to dense, lensed with silt and sand (GM).		0	0
			SPT N = 80					
		14.3						

REMARKS
After Auger Removed, Hole Caved to 9.8 feet
Hole Backfilled 6/24/81
Limit of Auger = 14.3 feet
Drilled 12 feet north of Control Point 273

Moderate to Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-265 — DWG NO FP-HV 8073

WAPA Form 6
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-270

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 7688+50 — Coordinates N 561,647 E 2,074,084 — Ground Elevation 2523 — Approx Dimensions 22" Auger
Date & Depth to Water 6/24/81 13.0 feet — Method of Excavation Power Pole Auger — Date 6/24/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.8						
SP-SM			S. Sack	3	0.0' - 0.8' TOPSOIL - about 60% sand, 15% low plasticity fines, 25% organic material Maximum Size fine sand, Color brown, Moisture dry, loose.			
			S. Sack	6	0.8' - 15.0' SAND - poorly graded, about 18% coarse gravel, 74% predominantly medium to fine sand, 8% non-plastic fines, Maximum Size 3", subangular, Color light brown, Moisture dry to saturated, medium dense (SP-SM).		0	0
			S. Sack	10	LL % / PI % / Gravel % / Sand % / Fines %: Granular / Non-Plastic / 18 / 74 / 8			
		15.0						

REMARKS
After Auger Removed, Hole Caved to 8 feet
Hole Backfilled 6/24/81
Required Depth = 15.0 feet
Drilled 50 feet south of Control Point 278

Easy Drilling, installed 10 feet of 2" PVC pipe as observation well

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-270 — DWG NO FP-HV 8074

WAPA Form 6
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-275

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8006+55 — Coordinates N 561,202 E 2,062,556 — Ground Elevation 2613 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/24/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.3						
			SPT N = 50	8	0.0' - 0.3' TOPSOIL - about 5% gravel, 15% sand, 50% low plasticity fines, 30% organic material Maximum Size 1/2", Color brown, Moisture dry, firm.			
CL			SPT N = 50	10	0.3' - 14.3' SILTY CLAY - about 5% gravel, 15% sand, 80% medium plasticity fines, Maximum Size 3", Color dark brown, Moisture dry to moist, hard, glacial till (CL).		0	0
		14.3	SPT N = 52	2				

REMARKS
At Auger Removal, Hole Caved to 9.3 feet
Hole Backfilled 6/24/81
Limit of Auger = 14.3 feet
Drilled 15 feet south of P1-281

Moderately Difficult Drilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-27S — DWG NO FP-HV 8075

WAPA Form 6
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-280

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8152+00 — Coordinates N 562,137 E 2,048,068 — Ground Elevation 2638 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/24/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5						
ML			S. Sack	5	0.0' - 0.5' TOPSOIL - about 25% sand, 50% low plasticity fines, 25% organic material, Maximum Size fine sand, Color light brown, Moisture dry, firm.			
					0.5' - 8.0' SANDY SILT - about 10% gravel, 25% predominantly fine sand, 65% low to non-plastic fines, Maximum Size 3", Color brown, Moisture moist, dense (ML).		0	0
		8.0	S. Sack	9	8.0' - 15.0' SANDY CLAY WITH COBBLES AND BOULDERS - about 20% gravel, 20% sand, 60% low to medium plasticity fines, Maximum Size 6", Color dark brown, Moisture moist, hard, glacial till (CL).		S	2
CL			S. Sack	11				
		15.0						

REMARKS
After Auger Removed, Hole Stood Open
Hole Backfilled 6/24/81
Required Depth = 15.0 feet
Drilled 12 feet south of Control Point 284

Very Difficult Drilling Below 8 feet.

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-280 — DWG NO FP-HV 8076

WAPA Form 6
(formerly WAPA-182-1)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-28S

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8334+50 — Coordinates N 563,200 E 2,029,738 — Ground Elevation 2703 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/24/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.1						
			SPT N = 28	8	0.0' - 0.1' TOPSOIL - about 10% gravel, 10% sand, 50% low plasticity fines, 30% organic material Maximum Size 1/2", Color brown, Moisture dry, firm.			
CL			SPT N = 43	14	0.1' - 14.2' SILTY CLAY WITH COBBLES - about 0-10% gravel, 10-25% sand, 70-90% medium plasticity fines, Maximum Size 5", Color dark brown, Moisture moist, hard, glacial till (CL).		2	0
			SPT N = 31	11	LL % / PI % / Gravel* % / Sand* % / Fines* %: 41 / 24 / 0 / 23 / 77			
		14.2						

REMARKS
After Auger Removal, Hole Sloughed to 10.0 feet
Hole Backfilled 6/24/81
Limit of Auger = 14.2 feet
*Lab test performed on sampled taken from 7.7 - 9.2 feet, gravel and cobbles noted in field.

Moderately Difficult Drilling, Drilled 20 feet west of Control Point 288.

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-28S — DWG NO FP-HV 8077

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LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-289

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8439+50 — Coordinates N 562,828 E 2,019,409 — Ground Elevation 2757 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/31/81 — Logged by V. Bed

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION, GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 5% gravel, 10% sand, 50% low plasticity fines, 35% organic material, scattered cobbles, Maximum Size 4", Color Brown, Moisture slightly moist, very stiff.		5	0
CL			SPT N=48	5	0.4' - 14.5' SILTY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 35% sand, 65% low plasticity fines, Maximum Size 12", Color Brown, Moisture slightly moist, hard to very stiff, glacial till (CL)		3	2
			SPT N=35	5				
		14.5	SPT N=28	11				

REMARKS
After auger removed, hole remained open
Hole backfilled 10/31/81
Limit of Augers = 14.5 feet
Drilled 10 feet south of control point 3034

Easy Drilling

HOLE NO AP81-289 — DWG NO FP-HV 8078

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

WAPA F 6400 4
(formerly WAPA-102-7)

132

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-290

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8513+15 — Coordinates N 561,911 E 2,012,060 — Ground Elevation 2713 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/24/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 60% coarse to fine sand, 20% low plasticity fines, 20% organic material Maximum Size coarse sand, subangular, Color brown, Moisture dry, loose.			
SM			S. Sack	8	0.5' - 8.0' SILTY SAND WITH COBBLES - poorly graded, about 10% coarse to fine gravel, 75% predominantly medium to fine sand, 15% non-plastic fines, Maximum Size 5", subangular, Color brown, Moisture moist, medium dense (SM).		3	0
		8.0	S. Sack	14				
CL			S. Sack	16	8.0' - 15.0' SANDY CLAY WITH COBBLES AND BOULDERS - about 10% gravel, 15% sand, 75% low to medium plasticity fines, Maximum Size 6", Color dark brown, Moisture moist, hard, glacial till (CL).		4	2
		15.0						

REMARKS
After Auger Removed, Hole Stood Open
Hole Backfilled 6/24/81
Required Depth = 15.0 feet
Drilled at PI-296

Moderately Difficult Drilling

HOLE NO AP81-290 — DWG NO FP-HV 8079

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

WAPA F 6400 4
(formerly WAPA-102-7)

133

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-291

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8614+50 — Coordinates N 561,709 E 2,002,881 — Ground Elevation 2782 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 10/31/81 — Logged by M. Brown

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.4			0.0' - 0.4' TOPSOIL - about 15% gravel, 15% sand, 30% medium plasticity fines, 40% organic material, scattered cobbles, Maximum Size 18", Color Brown, Moisture moist, stiff.		3	2
CL			SPT N=44	9	0.4' - 7.0' SILTY CLAY WITH COBBLES AND BOULDERS - about 15% gravel, 20% sand, 65% low to medium plasticity fines, Maximum Size 12", Color Brown, Moisture slightly moist, hard, glacial till (CL).		3	2
		7.0	SPT N=48	24				
					7.0' - 14.5' CLAYSTONE SHALE - about 10% fine sand, 90% medium to high plasticity fines, Maximum Size fine sand, Color Gray, Moisture moist, hard, blocky, oxides, Bearpaw shale.			
		14.5	SPT N=51	26				

REMARKS
After auger removed, hole remained open
Hole backfilled 10/31/81
Limit of Augers = 14.5 feet
Drilled 7 feet north of control point 293

Easy Drilling

HOLE NO AP81-291 — DWG NO FP-HV 8080

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

WAPA F 6400 4
(formerly WAPA-102-7)

134

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-295

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8805+97 — Coordinates N 556,532 E 1,984,590 — Ground Elevation 2709 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/24/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		1.0			0.0' - 1.0' FILL GRAVELLY CLAY - about 20% gravel, 15% sand, 65% medium plasticity fines, Maximum Size 2", Color brown, Moisture dry, firm, road material (CL).		0	0
			SPT N = 40	11				
CL					1.0' - 14.4' SILTY CLAY - about 5% gravel, 10% sand, 85% medium plasticity fines, Maximum Size 3/4", Color dark brown, Moisture moist, hard, glacial till (CL).		0	0
			SPT N = 40	16				
			SPT N = 57	9				
		14.4						

REMARKS
At Auger Removal, Hole Sloughed to 11.5 feet
Hole Backfilled 6/24/81
Limit of Auger = 14.4 feet
Drilled 110 feet west of PI-297

Moderately Difficult Drilling

HOLE NO AP81-295 — DWG NO FP-HV 8081

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

(formerly WAPA-102-T)

135

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-300

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 8936+00 — Coordinates N 548,370 E 1,977,710 — Ground Elevation 2900 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/23/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.1			0.0' - 0.1' TOPSOIL - about 5% gravel, 15% sand, 50% low plasticity fines, 30% organic material Maximum Size 1", Color brown, Moisture dry, firm.			
			SPT N = 61	8	0.1' - 14.3' SILTY CLAY WITH COBBLES - about 5% gravel, 5% sand, 90% medium plasticity fines, Maximum Size 5", Color brown, Moisture moist, hard, glacial till (CL).		2	0
CL			SPT N = 46	14				
		14.3	SPT N = 56	10				

REMARKS At Auger Removal, Hole Sloughed to 10.9 feet
Hole Backfilled 6/23/81
Limit of Auger = 14.3 feet
Drilled 10 feet south of Control Point 300

Moderately Difficult Orilling

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-300 — DWG NO FP-HV 8082

(formerly WAPA-102-T)

136

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-315

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9048+62 — Coordinates N 547,088 E 1,966,654 — Ground Elevation 2807 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/23/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.1			0.0' - 0.1' TOPSOIL - about 20% gravel, 10% sand, 50% low plasticity fines, 30% organic material, Maximum Size 1", Color brown, Moisture dry, firm.			
			SPT N = 71	8	0.1' - 14.4' SANDY CLAY WITH COBBLES - about 0-15% gravel, 15-25% sand, 70-85% medium plasticity fines, Maximum Size moist, hard, sand and gravel seams, glacial till (CL).		3	0
CL			SPT N=43/0.9	11	LL % 37 — PI % 20 — Gravel* % 0 — Sand* % 24 — Fines* % 76			
		14.4	SPT N = 41	12				

REMARKS At Auger Removal, Hole Sloughed to 10.5 feet
Hole Backfilled 6/23/81
Limit of Auger = 14.4 feet
*Lab test performed on sample taken from 7.9-9.3 feet, gravel and cobbles noted in the field

Moderately Difficult Orilling
Orilled 15 feet south of PI-302

NOTE Unless otherwise indicated % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-315 — DWG NO FP-HV 8083

(formerly WAPA 102-T)

137

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-320

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9162+00 — Coordinates N 546,813 E 1,955,291 — Ground Elevation 2827 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile 8-50 — Date 6/23/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
CL		0.5			0.0' - 0.5' TOPSOIL - about 5% sand, 50% medium plasticity fines, 45% organic material, Maximum Size fine sand, Color brown blac, Moisture moist, firm.			
			SPT N = 30	13	0.5' - 6.0' SILTY CLAY - about 10% sand, 90% low to medium plasticity fines, Maximum Size coarse sand, Color brown, Moisture moist, hard, (CL).		0	0
		6.0	SPT N = 61	13	6.0' - 14.3' SILTY CLAY - about 10% gravel, 10% sand, 80% medium to high plasticity fines, Maximum Size 3", Color dark brown, Moisture moist, hard, glacial till (CL).		0	0
CL		14.3	SPT N = 56	16				

REMARKS At Auger Removal, Hole Sloughed to 11.0 feet
Limit of Auger = 14.3 feet
Hole Backfilled 6/23/81
Hole Drilled at the crossing of Beaver Creek Road 800 feet west of Control Point 304.

Moderate to Hard Orilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-320 — DWG NO FP-HV 8084

(formerly WAPA 102-T)

138

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-325

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9263+50 — Coordinates N 546,896 E 1,945,854 — Ground Elevation 2819 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART— UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5						
SM			S. Sack	9	0.0' - 0.5' TOPSOIL - about 20% sand, 50% low plasticity fines, 30% organic material Maximum Size fine sand, Color light brown, Moisture moist, firm.			
		3.5			0.5' - 3.5' SILTY SAND - poorly graded, about 80% medium to fine sand, 20% non-plastic fines, Maximum Size sub-angular, Color red brown, Moisture moist, medium dense, (SM).		0	0
		3.7			3.5' - 3.7' BASALT - Color reddish brown, Moisture dry, fractured.			

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Bottom of Hole = 3.7 feet (Auger Refusal)
Orilled 200 feet east of control point 306

Easy Orilling to 3.5 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-325 — DWG NO FP-HV 8085

(formerly WAPA-182-7)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-330

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9293+50 — Coordinates N 546,896 E 1,942,631 — Ground Elevation 2924 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
GP		2.8 3.0	S. Sack	3	0.0' - 2.8' GRAVEL - poorly graded, about 95% coarse to fine gravel, 5% sand, Maximum Size 2", angular, Color brown, Moisture dry, dense, basaltic origin, colluvium (GP). 2.8' - 3.0' BASALT - Color light gray, Moisture dry, very dense.		0	0

REMARKS After Auger Removed, Hole Caved to 1.0 feet
Hole Backfilled 6/23/81
Bottom of Hole = 3.0 feet (Auger Refusal)
Drilled 25 feet west of Control Point 307A

Very Difficult Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-330 — DWG NO FP-HV 8086

(formerly WAPA-182-7)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-33S

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9304+58 — Coordinates N 546,631 E 1,941,779 — Ground Elevation 2756 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5	S. Sack	9	0.0' - 0.5' TOPSOIL - about 20% sand, 50% low plasticity fines, 30% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
CL			S. Sack	S	0.5' - 15.0' SANDY CLAY - 3% gravel, 29% sand, 68% medium plasticity fines, Maximum Size 3", Color dark brown, Moisture hard (CL).		0	0
			S. Sack	10	LL % 33 — PI % 17 — Gravel % 3 — Sand % 29 — Fines % 68			
		15.0						

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Required Depth = 15.0 feet
Drilled 300 feet west of P1-307

Difficult Drilling from 6.0 to 8.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-33S — DWG NO FP-HV 8087

(formerly WAPA-182-7)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-339

Feature Fort Peck - Havre 230 KV Transmission Line — State
Station 9330+00 — Coordinates N 546,452 E 1,938,856 — Ground Elevation 2751 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 15% sand, 50% low plasticity fines, 35% organic material Maximum Size fine sand, Color brown, Moisture dry, soft.			
CL			S. Sack	13	0.5' - 4.0' SANDY CLAY WITH COBBLES - about 10% gravel, 15% sand, 75% low to medium plasticity fines, Maximum Size 4", Color brown, Moisture moist, hard (CL).		2	0
		4.0 4.5			4.0' - 4.5' BASALT - Color light brown, Moisture dry, very dense.			

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Bottom of Hole = 4.5 feet (Auger Refusal)
Drilled 800 feet east of Control Point 308

Very Difficult Drilling below 4.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-339 — DWG NO FP-HV 8088

(formerly WAPA-182-7)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-340

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9338+00 — Coordinates N 546,577 E 1,938,056 — Ground Elevation 2721 — Approx Dimensions 22" Auger
Data & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5	S. Sack	15	0.0' - 0.5' TOPSOIL - about 50% predominantly coarse sand, 40% low plasticity fines, 10% organic material, Maximum Size coarse sand, subangular, Color brown, Moisture dry, loose.			
CL		4.0 4.5	S. Sack		0.5' - 4.0' SANDY CLAY WITH COBBLES - about 15% gravel, 20% sand, 75% low plasticity fines, Maximum Size 4", Color light brown, Moisture moist, firm (CL).		S	0
					4.0' - 4.5' BASALT - Color brown, Moisture dry, very hard.			

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Bottom of Hole = 4.5 feet (Auger Refusal)
Drilled 125 feet north of Control Point 308

Very Difficult Drilling below 4.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-340 — DWG NO FP-HV 8089

WAPA T 6400 a
(formerly WAPA-102-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-341

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9348+00 — Coordinates N 546,452 E 1,937,057 — Ground Elevation 2731 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 10% sand, 60% low plasticity fines, 30% organic material, Maximum Size medium sand, Color brown, Moisture moist, firm.			
CL			S. Sack	11	0.5' - 12.0' SILTY CLAY WITH COBBLES - about 10% gravel, 10% sand, 80% low to medium plasticity fines, Maximum Size 5", Color brown, Moisture moist, hard (CL).		3	0
			S. Sack	12				
		12.0	S. Sack	11	12.0' - 12.5' BASALT - Color light brown, Moisture dry very dense, massive			
		12.5						

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Bottom of Hole = 12.5 feet (Auger Refusal)
Drilled 1000 feet west of Control Point 308

Easy Drilling to 12.0 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-341 — DWG NO FP-HV 8090

WAPA T 6400 a
(formerly WAPA-102-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-342

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9358+00 — Coordinates N 546,452 E 1,936,057 — Ground Elevation 2728 — Approx Dimensions 22" Auger
Date & Depth to Water Not Encountered — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 50% medium to fine sand, 30% low plasticity fines, 20% organic material, Maximum Size medium sand, Color brown, Moisture dry, loose.			
SM			S. Sack	4	0.5' - 11.5' SILTY SAND WITH COBBLES - poorly graded, about 3% gravel, 63% coarse to fine sand, 34% non-plastic fines, Maximum Size 5", subangular, Color light brown, Moisture moist, medium dense (SM).		3	0
			S. Sack	4				
		11.5						
		12.5			11.5' - 12.5' BASALT - Color light brown, Moisture dry, very dense.			

LL %	PI %	Gravel %	Sand %	Fines %
Granular		3	63	34
Non-Plastic				

REMARKS After Auger Removed, Hole Stood Open
Hole Backfilled 6/23/81
Bottom of Hole = 12.5 feet (Auger Refusal)
Drilled 2000 feet west of control point 308

Easy Drilling to 11.5 feet

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-342 — DWG NO FP-HV 8091

WAPA T 6400 a
(formerly WAPA 102-T)

LOG OF TEST PIT OR AUGER HOLE
FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-345

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana
Station 9384+18 — Coordinates N 546,467 E 1,933,822 — Ground Elevation 2724 — Approx Dimensions 9" Auger
Date & Depth to Water Not Encountered — Method of Excavation Mobile B-50 — Date 6/23/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—UNIFIED SOIL CLASSIFICATION GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.1			0.0' - 0.1' TOPSOIL - about 10% sand, 65% low plasticity fines, 25% organic material, Maximum Size fine sand, Color brown, Moisture dry, firm.			
			SPT N = 13	5				
SM					0.1' - 11.0' SILTY SAND - poorly graded, about 60% predominantly fine sand, 40% non-plastic fines, Maximum Size coarse sand, subangular, Color brown, Moisture medium dense (SM).		0	0
			SPT N = 30	4				
		11.0			11.0' - 14.4' SILTY CLAY - about 10% fine sand, 90% low plasticity fines, Maximum Size fine sand, Color brown, Moisture moist, hard, glacial till (ML-CL).		0	0
ML-CL			SPT N = 68	10				
		14.4						

REMARKS After Auger Removed, Hole Caved to 8.7 feet
Hole Backfilled 6/23/81
Limit of Augers = 14.4 feet
Drilled north of PI-309

Easy Drilling

NOTE Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-345 — DWG NO FP-HV 8092

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature Fort Peck - Havre 230 kV Transmission Line — State Montana

Hole No PR 81-350 — Coordinates N 554,618 E 1,932,462 — Ground Elevation 2593

Depth and Elev of Water Level* 2.3 feet — Location 120' north of PI-311 Station 9470+00 — Total Depth 49.5 feet

*Date Measured 6/23/81 — Date Begun 6/23/81 — Finished 6/23/81 — Logged by K. Barnes — Reviewed by A. Stilley

NOTES Water losses, type and size of hole, drilling method and conditions, Caving and other information	CORE RECOVERY-%	BLOWS/FOOT	WATER CONTENT-%	SAMPLES FOR TESTING	DEPTH (FT)	GRAPHIC LOG	PENETRATION RESISTANCE Blows per Foot (Weight of Hammer 140 lb., Height of Drop 30 in.) 0 10 20 30 40 50	CLASSIFICATION AND DESCRIPTION OF MATERIAL
Drill Equipment: Mobile B-50 Rotary, Truckmounted	100	5	30	SPT	0.5			0.0' - 0.5' Topsoil - about 15% fine sand, 40% low plasticity fines, 45% organic material, black, moist, firm
Driller: B. Neff	100	5	31	SPT	10	CL		0.5' - 12.0' Silty Clay - Maximum particle size fine sand, about 20% fine sand, 70% low to medium plasticity fines, brown, moist to saturated, soft to firm, alluvial (CL)
Method: Drilled with 9" diameter hollow-stem augers. Drive samples (SPT) taken at the intervals listed below	100	8	16	SPT	12.0			
	100	5	20	SPT	7.0	SM		12.0' - 17.0' Silty Sand - Maximum particle size medium sand, 87% fine to medium sand, 13% non-plastic fines, poorly graded, subangular to subrounded, brown, saturated, loose, alluvial (SM)
	100	4	29	SPT	20			
Drive Sample Intervals, feet: 3.0 - 4.5	100	10	20	SPT	17.0	CL		LL % / PI % / Gravel % / Sand % / Fines %: Granular / Non-Plastic / 0 / 87 / 13
8.0 - 9.5	100	8	23	SPT	30			
13.0 - 14.5								
18.0 - 19.5	100	7	20	SPT				
23.0 - 24.5					40			
28.0 - 29.5					42.5			17.0' - 42.5' Silty Clay - Maximum particle size fine sand, about 10-30% fine sand, 70-90% low to medium plasticity fines, sandy seams, brown, saturated, soft to stiff, alluvial (CL)
33.0 - 34.5	100	43	13	SPT	45.0	SP - CL		
38.0 - 39					49.5			42.5' - 45.0' Gravelly Sand - Maximum particle size 3/4 inch, about 10% fine gravel, 85% fine to medium sand, 5% fines, sub-angular to rounded, brown, saturated, dense, alluvial (SP)
43.0 - 44.5					50			
48.0 - 49.5	100	35	12	SPT				45.0' - 49.5' Silty Clay - Maximum particle size 1/2 inch, about 5% fine gravel, 5% sand, 90% medium plasticity fines, brown, saturated, hard, glacial till (CL)
Progress Report: D-49.5' 6/23/81 Installed 44.5' of 2" diameter PVC pipe as observation well. After augers removed, hole caved to 24'. Very easy drilling to 40 feet					60			
Hole Backfilled: 6/23/81					70			
Water Level: 2.3' 6/23/81					80			
					90			

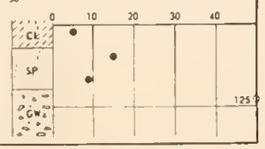
0 10 20 30 40 50

EXPLANATION

BLOWS/FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated, thus, 50/.4 indicates 0.4 foot penetrated with 50 blows, extrapolated as 125 blows/foot

CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND, 95% predominantly medium sand, 5% nonplastic fines, max size 1 4 inch, firm, moist, gray, uncemented (SP)

PENETRATION RESISTANCE — Plot, as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125



FEATURE Fort Peck - Havre 230 kV Transmission Line — STATE Montana — HOLE NO PR 81-350 — DWG NO. FP-HV 8093

LOG OF TEST PIT OR AUGER HOLE FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-355

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana

Station 9488+55 — Coordinates N 554,450 E 1,930,595 — Ground Elevation 2588 — Approx Dimensions 22" Auger

Date & Depth to Water 6/23/81; 5.0 feet — Method of Excavation Power Pole Auger — Date 6/23/81 — Logged by W. Henning

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5-INCH
		0.5			0.0' - 0.5' TOPSOIL - about 5% sand, 60% medium plasticity fines, 35% organic material, Maximum Size fine sand, Color brown, Moisture moist, soft.			
CL			S. Sack	35			0	0
		6.0			0.5' - 6.0' SILTY CLAY - about 10% sand, 90% medium plasticity fines, Maximum Size fine sand, Color brown, Moisture moist to saturated, firm to soft (CL).			
			S. Sack	33			0	0
SC-CL					6.0' - 15.0' CLAYEY SAND - poorly graded, about 52% predominantly fine sand, 48% low plasticity fines, Maximum Size medium sand, saturated, subangular, Color brown, Moisture saturated, medium dense to loose (SC-CL).			
			S. Sack	32	LL % / PI % / Gravel % / Sand % / Fines %: 23 / 7 / 0 / 52 / 48			
		15.0						

REMARKS: After Auger Removed, Hole Caved to 11.0 feet. Hole Backfilled 6/23/81. Required Depth = 15.0 feet. Drilled 10 feet east of PI-312. Easy Drilling, installed 13 feet of 2" PVC pipe as observation well.

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-355 — DWG NO FP-HV 8094

LOG OF TEST PIT OR AUGER HOLE FOR BORROW AND FOUNDATION INVESTIGATIONS

Hole No AP81-360

Feature Fort Peck - Havre 230 KV Transmission Line — State Montana

Station 9542+04 — Coordinates N 550,128 E 1,927,436 — Ground Elevation 2636 — Approx Dimensions 9" Auger

Date & Depth to Water 6/22/81; 7.8 feet — Method of Excavation Mobile B-50 — Date 6/22/81 — Logged by K. Barnes

UNIFIED SOIL CLASSIFICATION SYMBOL LETTER	GRAPHIC	DEPTH (FEET)	SIZE AND TYPE OF SAMPLE TAKEN	IN PLACE MOISTURE (%)	CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE CHART—"UNIFIED SOIL CLASSIFICATION" GIVE GEOLOGIC AND IN PLACE DESCRIPTION FOR FOUNDATION INVESTIGATIONS)	PERCENT MOISTURE	PERCENTAGE BY VOLUME OF 3-5 INCH	PERCENTAGE BY VOLUME OF PLUS 5 INCH
		0.2			0.0' - 0.2' TOPSOIL - about 5% gravel, 40% predominantly fine sand, 30% non-plastic fines, 25% organic material, Maximum Size 1/2", Color brown, Moisture moist, firm.			
GM			SPT N = 39	1				
		5.5			0.2' - 5.5' SILTY GRAVEL WITH COBBLES - poorly graded, about 60% coarse to fine gravel, 25% coarse to fine sand, 15% non-plastic fines, Maximum Size 5", subrounded, Color brown, Moisture moist to wet, dense (GM).		3	0
SP			SPT N = 38	9				
		10.5			5.5' - 10.5' SAND - poorly graded, about 10% fine gravel, 85% predominantly medium to fine sand, 5% non-plastic fines, Maximum Size 3/4", subangular, Color brown, Moisture wet to saturated, medium dense (SP).		0	0
CL			SPT N = 31	17				
		14.1			10.5' - 14.1' SANDY CLAY - about 10% gravel, 15% sand, 75% medium plasticity fines, Maximum Size 1/2", Color brown, Moisture saturated, hard, glacial till (CL).		0	0

REMARKS: After Auger Removed, Hole Caved to 7.9 feet. Hole Backfilled 6/22/81. Limit of Auger = 14.1 feet. Drilled 10 feet south of PI-313. Moderately Difficult Drilling. Installed 15' of 2" PVC pipe as observation well.

NOTE: Unless otherwise indicated, % by volume of 3-5" & plus 5" material is estimated

HOLE NO AP81-360 — DWG NO FP-HV 8095

SUBSURFACE EXPLORATION - PENETRATION RESISTANCE AND LOG

Feature: Fort Peck - Havre 230 KV Transmission Line — State: Montana

Hole No: PR 81-365 — Coordinates N. 550,156 E. 1,927,107 — Ground Elevation: 2635

Depth and Elev of Water Level*: Not Encountered — Location: 30 feet west of PI-314 Station 9545+64 — Total Depth: 24.5 feet

*Date Measured: 10/31/81 — Date Begun: 10/31/81 — Finished: 10/31/81 — Logged by: M. Brown — Reviewed by: A. Stilley

NOTES Water losses, type and size of hole, drilling method and conditions, caving and other information

Drill Equipment:
Mobile B-50 Rotary, Truck-mounted

Driller
B. Neff

Method
Drilled with 9" diameter hollow-stem augers. Drive samples (SPT) taken at the intervals listed below.

Drive Sample Intervals, Feet:
3.0 - 4.5
8.0 - 9.5
13.0 - 14.5
18.0 - 19.5
23.0 - 24.5

Progress Report
0-24.5' 10/31/81
After auger removed, hole remained open. Easy drilling

Hole Backfilled
10/31/81

CORE RECOVERY, %	BLOWS/FOOT	WATER CONTENT, %	SAMPLES FOR TESTING	DEPTH (FT.)	GRAPHIC LOG
50	20	3	SPT	0.4	
				2.5	CL
100	17	18	SPT		SW
				7.0	
100	12	16	SPT	10	
					CL
100	17	16	SPT	20	
100	20	16	SPT	24.5	
				30	
				40	
				50	
				60	
				70	
				80	
				90	

PENETRATION RESISTANCE
Blows per Foot
Weight of Hammer 140 lb.
Height of Drop 30 in.
0 10 20 30 40 50

CLASSIFICATION AND DESCRIPTION OF MATERIAL

0.0'-0.4' TOPSOIL - about 10% gravel, 20% sand, 30% medium plasticity fines, 40% organic material, Maximum Size 2", Color Brown, Moisture moist, stiff

0.4'-2.5' SANDY CLAY - about 10% gravel, 30% sand, 60% medium plasticity fines, Maximum Size 3", Color Brown, Moisture slightly moist, stiff, glacial till (CL).

2.5'-7.0' GRAVELLY SAND - about 25% gravel, 60% sand, 15% low plasticity fines, Maximum Size 2", Color Brown, Moisture moist, medium dense, glacial till (SW).

7.0'-24.5' SANDY CLAY - about 38% predominantly fine sand, 62% low plasticity fines, Maximum Size medium sand, Color Brown, Moisture moist, stiff to very stiff, glacial till (CL).

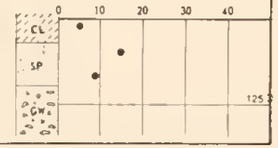
LL	PI	Gravel	Sand	Fines
29	15	0	38	62

EXPLANATION

BLOWS FOOT — Record number of blows required for one foot of penetration. If 50 blows result in less than one foot of penetration, record depth penetrated; thus, 50/ 4 indicates 0 4 foot penetrated with 50 blows, extrapolated as 125 blows-foot

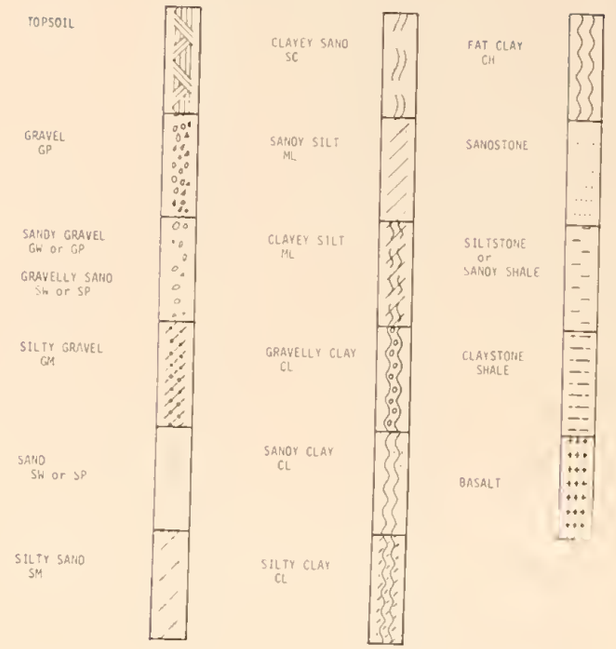
CLASSIFICATION AND DESCRIPTION — Describe soil type, with emphasis on inplace condition. Include Unified Soil Classification symbol. EXAMPLE: POORLY GRADED SAND 95% predominantly medium sand 5% nonplastic fines max size 1 4 inch, fium, moist, gtay, uncemented (SP)

PENETRATION RESISTANCE — Plot as shown at right. Actual values ●, extrapolated values at 50, open circle with extrapolated value 125○



FEATURE Fort Peck-Havre 230 KV Transmission Line — STATE Montana — HOLE NO PR 81-365 — DWG NO. FP-HV 8096

GRAPHIC SYMBOLS FOR GEOLOGIC LOGS
FORT PECK - HAVRE 230 KV TRANSMISSION LINE



NORTHERN TESTING LABORATORIES, INC
PLATE NO. 1

FP-HV 8097

DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA